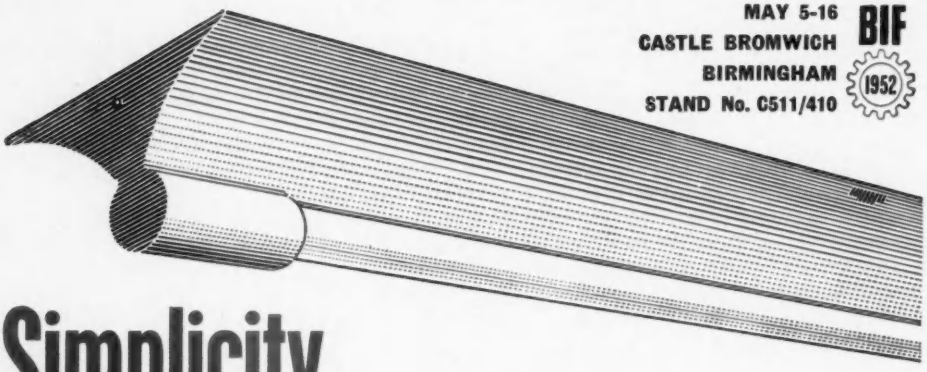
ELECTRICAL TIMES

THURSDAY
24 APRIL
1952
NINEPENCE

MAY 5-16
CASTLE BROMWICH
BIRMINGHAM
STAND No. C511/410
BIF 1952



Simplicity is the keynote

of this popular Mazda fitting

The graceful " Seagull " contours of this fitting form a natural line between the fluorescent lamp and the ceiling. At the same time, the white reflecting surfaces give an even distribution of light over a wide area. Essentially the Mazda F.1030/1/8060 is a neat, unobtrusive fitting designed for speedy installation and simplified maintenance.

Mazda F.1030/1/8060

For use with a single Mazda 80 watt Fluorescent Lamp.

All the lamp auxiliary gear is mounted on a detachable backplate and ready wired to a connector block. This backplate is first mounted flush to the ceiling after which the main body of the fitting is simply attached by two knurled nuts.

Sliding end-covers support the lamp and conceal lamp-end flicker.

Construction is of stout gauge sheet steel finished in durable white stoved enamel.

Mazda

lamps stay brighter longer

THE BRITISH THOMSON-HOUSTON CO. LTD.
Crown House, Aldwych, London, W.C.2.
(*Member of the A.E.I. Group of Companies*)

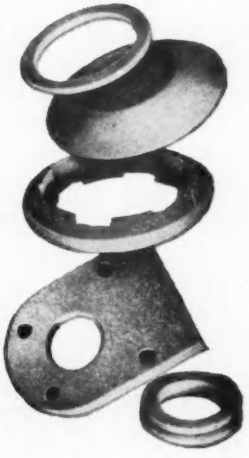
M4369A

BTH Lighting Advisory Service

Lighting Engineers of the BTH Lighting Advisory Service will be glad to help you plan any lighting scheme. Their expert services can be freely drawn upon at all times through any BTH Office.

B T-H

On the "Mauretania" and the two "Queens," on railway systems throughout the world, certainly in your own car, Coopers Felt is proving an invaluable material for a surprising number of purposes. Have you considered felt? One of Coopers' experts will be happy to answer any questions.



COOPERS
FELT

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Head Office & Works:
COOPER & CO. (BIRMINGHAM) LTD.
BRYNMAWR, Breconshire
Tel.: Brynmawr 312 Telegrams: Felting Brynmawr
Registered Office & Works: Little King Street, Birmingham

...and not a penny on battery repairs in 12 years*?

Yes—AND 740 cells in use

What's so special about Nife?

They're made of STEEL—an engineering job

* *These are the actual details of the performance of Nife batteries operated by a Municipal Authority.*

Every Nife battery is a superb example of precision engineering in steel. This technical perfection is the reason why there is 'longer life in a Nife'—and almost complete freedom from replacement costs.

ROBUST CONSTRUCTION Made of steel — case and plates — a Nife battery has enormous mechanical strength.

COMPLETE RELIABILITY The almost inert electrolyte is actually a steel preservative—so that the battery does not deteriorate even during long periods of inactivity. It will withstand the heaviest rates of charge or discharge — and recover its voltage almost immediately.

SIMPLE MAINTENANCE A Nife is, for all practical purposes, free from self-discharge — the steel plates cannot buckle or shed active material and there is no corrosion of terminals.

(*N.B. Nife Batteries are not yet available for private cars or domestic radio.*)

N25

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Sole Manufacturers of **TOK** *switches*

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a perfect reception

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The outstanding accuracy and high speed of operation make this lathe idea! for the rapid and economic production of repetition screw parts.

Murad

CAPSTAN LATHE

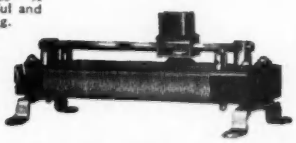
MURAD DEVELOPMENTS LTD
STOCK LANE · AYLESBURY · BUCKS
Phone Aylesbury 790 (4 lines) Cables Muradite Aylesbury

IT IS A "CRESSALL-PRODUCT"

CRESSALL Resistances incorporate the soundest electrical and mechanical principles in design—yet prices are competitive.

CRESSALL Resistance

List No. 80 containing data and prices of our standard sliding Resistances is both useful and interesting. May we send you a copy?



CRESSALL

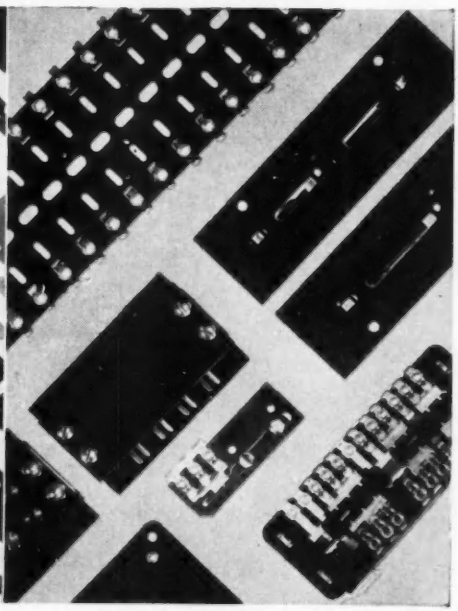
Registered Trade Name of

THE CRESSALL MANUFACTURING CO. LTD.
TOWER STREET BIRMINGHAM 19
TELEPHONE: ASTON CROSS 2666 (3 lines)
TELEGRAMS: "OHMIC" BIRMINGHAM

Components made from DELARON LAMINATED PLASTIC possess insulation properties which remain constant within very close limits. Delaron is tough and durable, easy to machine and punch and the range includes grades which conform to all Industrial, British Standard and Ministry Specifications. Delaron is economical too and is supplied in the widest range of board sizes up to 9′ x 4′. Our Technical Service Department will be glad to talk over your problems, or if you will send full details, we will let you have samples by return.

We are indebted to our friends in the Radio and Electric Industry for permission to reproduce these components.

Punched electrical components showing clean finish of edges after machining of intricate parts.



Electrical terminal strips and variable resistors for radio construction.

DELARON

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IMPERIAL HOUSE, 84/86 REGENT STREET, LONDON, W.1. PHONE: REGENT 2901

Twenty-nine years of progressive leadership in electric water heating

In 1923 Sadia first introduced white enamel electric water heaters of pleasing appearance and scientific construction — still the basis of all modern designs.

In 1939 Sadia developed the type U.D.B., the first electric water heater designed for installation "under the draining board", incorporating two heating units — sold today in large quantities.

This was followed in 1946 by the Sadia type C.E.L. Coal-Electric water heater with the patented self-filling and self-venting calorifier — the most efficient and economical Sadia water heater.

In 1951 the 'U' series of Aidas immersion heaters included the first thermostatically controlled immersion heater for fitting in a $1\frac{1}{4}$" screwed flange.

Now, in 1952, after 29 years, Sadia still leads the field for modern design, quality and performance.

SADIA
HOT WATER BY ELECTRICITY

AIDAS ELECTRIC LIMITED
Sadia Works, Rowdell Road, Northolt, Middlesex.
Scottish Agents: W. Brown & Co., (Engineers) Ltd., 89, Douglas Street, Glasgow, C.2. Manufactured in South Africa by: Sadia Water Heaters (Pty) Ltd., 3-5, Newton Street, Village Main, Johannesburg.

Gears without Teeth

Shell research people are constantly experimenting to find even better lubricants for use in gears. For specialised wear study, four-ball and two-ball machines simulate ingeniously the combined rolling-sliding motion that occurs in gear tooth engagement.

In another machine spinning bronze discs in loaded contact give an accurate representation of wear on gears in actual service. Speed, direction of rotation and diameter of the discs can be varied to allow for the wide variety of conditions found in practice.

What happens to oils in high-speed gears? That problem is studied at Thornton in gear rigs which turn at up to 15,000 r.p.m.

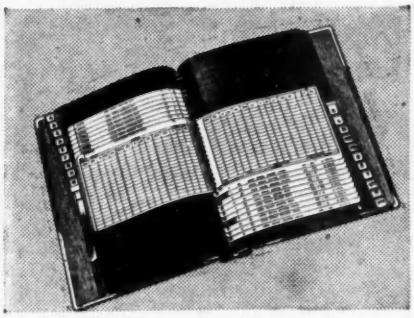
Shell research is not a rapid process because any one result has to be tested again and again, in theory and practice, before it is allowed to stand. The Shell Lubricant in *your* gears is the result of this kind of research in-depth.

SHELL LEADERSHIP IN LUBRICATION

B

ELECTRICAL ENGINEERS!

A New Production Record to Control—VISIBLY—Output of Electrical Components



A number of new visible records have recently been designed to help production and administration in the field of Electrical Engineering.

These cover a variety of purposes and meet almost every need in this field.

Take, for instance, a new "Shop Achievement" record as a typical example of how such records give visual control of output—plus a substantial saving in time and clerical labour.

This record details the daily and weekly output of components, rejects, customer's order number, shop or code number, delivery dates, shipments, inspection releases, etc., etc.

A few dozen or thousands of such records can be compactly housed in panels or books so that any single one is VISIBLE for instantaneous check of progress—thus saving time on reference and clerical entry. The responsible executive can control any and every operation and component —thus speeding up output and securing flexibility.

Machine maintenance and machine loading records, plus pattern and drawing records are also available.

Full details of such existing records—plus facilities for designing others specially to your needs—are freely available. Just write "Electrical Records" on your letter heading and full details will be sent you by return.

Shannon Systems

FIRST IN FILING

THE SHANNON LTD.,

768 Shannon Corner, New Malden, Surrey

RAILS for SALE

500 tons New Perfect F.B. Rails, 109 lb yard, chiefly 60 ft lengths.

200 tons New Perfect Bull Head Rails, 95 lb yard, Revised B.S. lengths, chiefly 60 ft.

200 tons Good Secondhand Bull Head Rails, about 80/85 lb yard, lengths chiefly 30 ft and 60 ft.

20 tons New Slightly Defective F.B. Rails, 60 lb yard, Revised B.S. Section, lengths about 40 ft.

500 tons New Stock Rusty F.B. Rails, 75 lb yard, B.S. Revised lengths chiefly 12 ft to 12 ft 10½ in.

25 tons Good Secondhand F.B. Rails, 40/45 lb yard, 30 ft/35 ft lengths.

About 350 New Complete Turnouts, 24 in gauge, made from 20 lb F.B. Rails, mounted on Steel Sleepers about 15/16 ft 6 in overall.

50 Very Good Secondhand Double Side Tip Wagons, 2 ft gauge. 1 cu. yd cap., 16 in wheels, 2¾ in axles, in metal lined plain bearings, strong construction.

90 Good Secondhand Double Side Tip Wagons, 2 ft gauge, 1 cu. yd capacity, Hudson make with Roller or Ball Bearings.

6 ditto, ditto, 2/3 cu. yd capacity.

500 Steel Sleepers, 2 ft gauge, to suit 20 lb F.B. Rails, complete with Clips and Bolts.

350 Pairs New Fishplates punched at 4 in centres for 35 lb F.B. Rails.

50 tons New Stock Rusty Fishplates to suit 75 lb F.B. Rails, B.S. Section, punched at 4 in centres.

1,000 yards Good Secondhand Portable Railway, 2 ft gauge, made from 20 lb F.B. Rails, mounted on Steel Sleepers complete with all fastenings.

10 tons Good Secondhand F.B. Rails, 14 lb per yard, chiefly 16 ft lengths.

14 tons Good Secondhand Reusable Chair Screws, 6⅜ in x ⅞ in dia.

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Before you get down to estimating on any new installation, ask for details of Channel "Spring Capped" Conduit. We shall be glad to cost any scheme you are planning. Architects, electrical engineers and contractors will find, particularly on multi-conduit runs, that up to two-thirds of the normal costs can be saved. Installation is extremely simple and the system is completely flexible.

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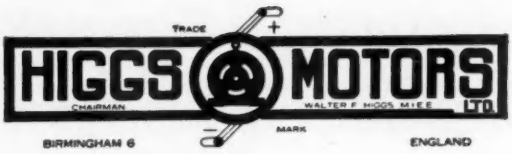

KAP-IT-AL-IST

Jack Jones is a capitalist, he has three hens; he feeds them with scraps from the kitchen, obtains eggs and makes a profit. Mr. Smith is a bloated capitalist, he has twenty hens and sells ten eggs a day—profit—puts the money in the bank. One day he buys another hen house and more hens. He now sells 50 eggs a day and puts the profit in the bank—ploughs it back. He can now rent five acres and buy more hens and houses which will produce more eggs. Mr. Do-nowt his neighbour used to be friendly but will not speak now.

GUARANTEED FOR EVER

Belfast, Birmingham, Bristol, Dundee, Glasgow, London
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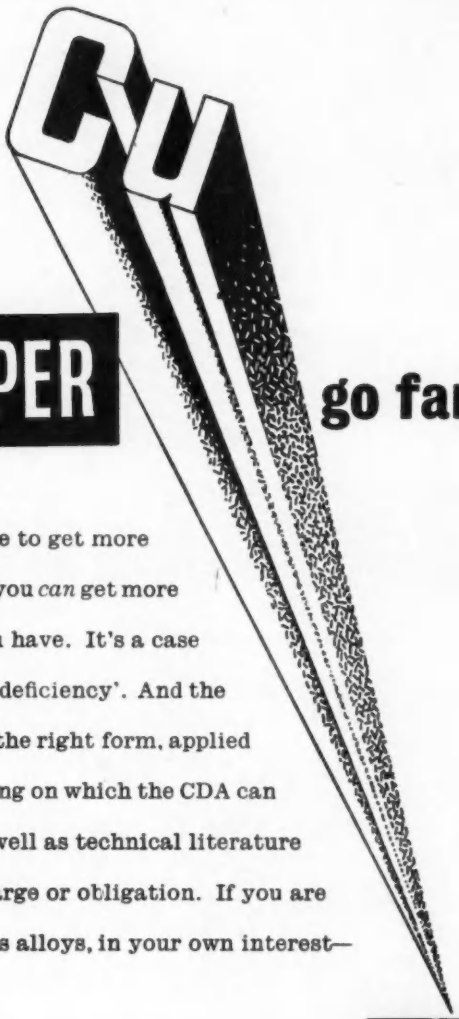

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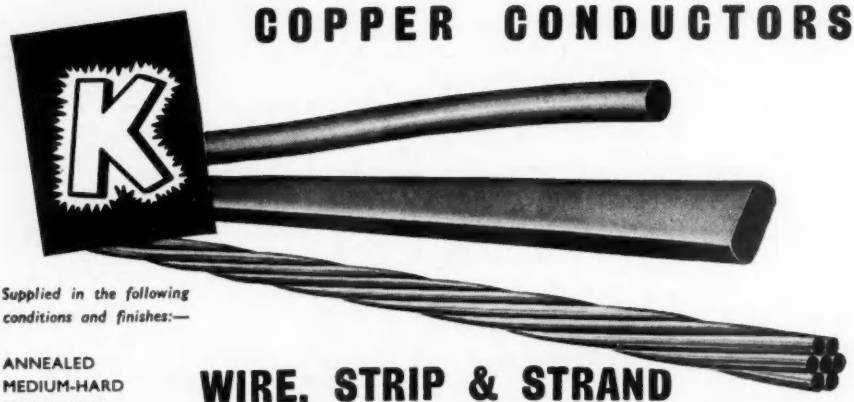
Consult the CDA

COPPER DEVELOPMENT ASSOCIATION KENDALS HALL · RADLETT · HERTS

COPPER CONDUCTORS



Supplied in the following conditions and finishes:—

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The new
SWIRLUX
Type 501
is now available
Limited numbers of this 'large capacity—low price' washing machine, with its new SWIRLUX patented agitator and full-size Acme hand wringer are now available for distribution in the home market.
Further details of this remarkable 'family' washer are available from the manufacturers:
UNIVERSAL BOILERS & ENGINEERING Co. Ltd.
Burnley, Lancs.
A 'VERSCO' PRODUCT

KEEP YOUR ELECTRICITY COSTS DOWN

by ensuring that you do not exceed your target maximum demand

- Time dial (5 min. resetting).
- Target setting pointer.
- Load pointer.
- Sealing device.

Instal a

FERRANTI

3-Phase

MAXIMUM DEMAND ALARM

- Advance warning of approaching maximum demand — steps can then be taken to reduce load.
- Load reviewed every five minutes.
- Large clear dial for easy target setting.
- Load pointer and time dial clearly visible.
- Substantial contacts for operating separate warning device.

Please write for List IR.7.

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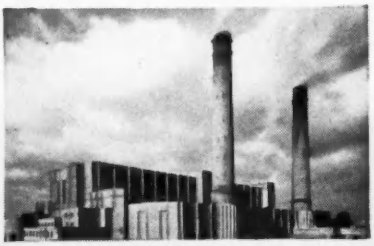
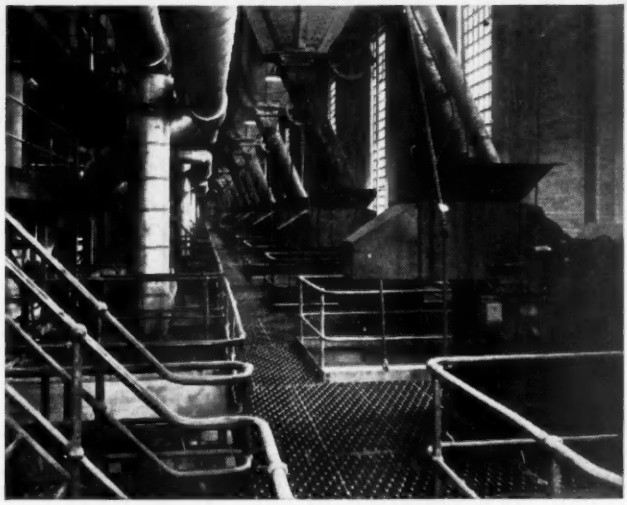
F174



CROYDON 'B'



A view along the line of coal weighers feeding the pulverisers

Civil Consulting Engineers: C. S. Allott & Son
Consulting Engineer: F. N. Rendell-Baker, M.I.E.E.

The first two sections of the new Croydon "B" Generating Station will contain eight Simon-Carves high-head pulverised fuel fired boilers; six are already in commission and the other two are scheduled to steam during 1952. These eight units, each with a maximum continuous rating of 320,000 lbs. per hour at 875° F and 650 lbs. per sq inch pressure, supply steam for the generation of 210,000 kilowatts. The ash and dust handling plants are also by Simon-Carves. Fine flue dust is collected and taken to the disposal bunkers by a pneumatic handling installation, the distance from the bunkers to the farthest dust collection point being approximately 1,200 ft.

Steam power by ***Simon-Carves Ltd*** SIMON ENGINEERING GROUP

STOCKPORT ENGLAND

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20 years after—

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(Private Branch Exchange)

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Electrical Work in all Branches

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NORTH CHEAM, SURREY
Repairs and Maintenance Dept.

IN ANY REPLY PLEASE QUOTE :—
DIX/JEM
Your Ref. PBH/AJM

6th November, 1951.

Venner Time Switches Ltd.,
Kingston By Pass Road,
New Malden, Surrey.

Dear Sirs,

Re. Advice Note No. 40274

We have duly received this hand wound Time Switch which has now been fitted and is working satisfactorily.

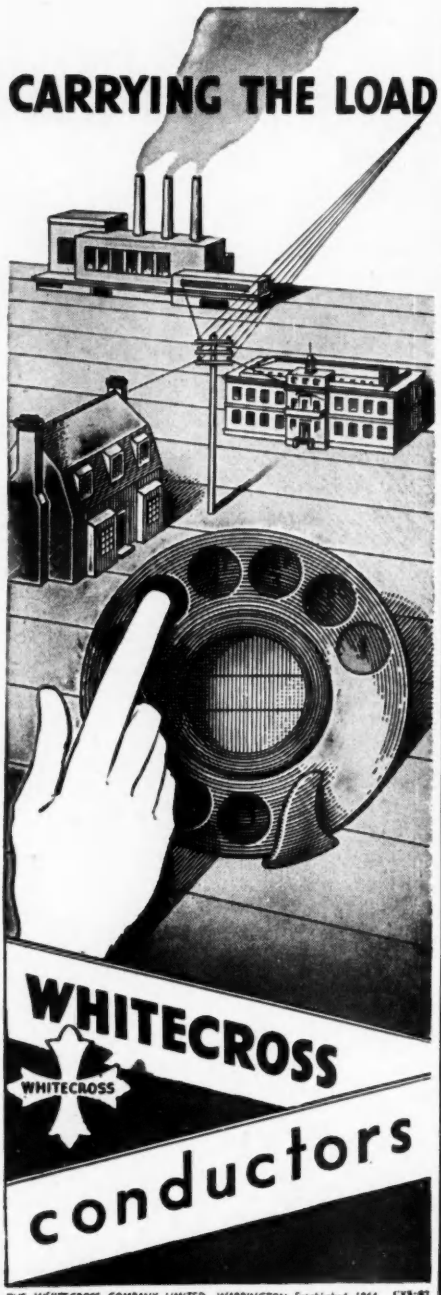
We should like to take this opportunity to mention, that the Writer has had in continuous use for a period of about 20 years, one of your hand wound Time Switches, which has always given perfect service without any attention. We should like to know, however, whether any maintenance such as oiling should be carried out to this instrument, or whether no attention in this respect is necessary.

The instrument in question carries the following numbers 197886 BF2 30786.

Yours faithfully.

It's time YOU switched to VENNER

VENNER LIMITED · KINGSTON BY-PASS · NEW MALDEN · SURREY. TEL.: MALden 2442



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SINGLE & DOUBLE WORM REDUCTION MOTORISED GEAR UNITS

BUILT TO BRITISH STANDARD SPECIFICATION

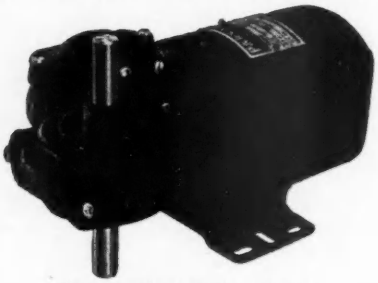

Illustration shows double reduction

¼ TO 840 R.P.M.
TORQUE UP TO 30 LBS./INS.
COMMUTATOR TYPE MOTORS
A.C., D.C. OR UNIVERSAL

SEND FOR DESCRIPTIVE LEAFLETS TO SOLE MANUFACTURERS:

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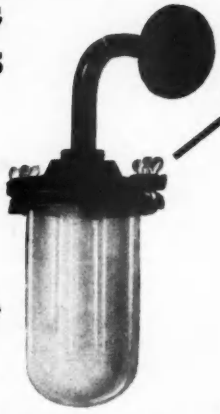
WEATHERPROOF LIGHTING FITTINGS



New up to date list now available on request

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also Glasgow, London & Newcastle-on-Tyne

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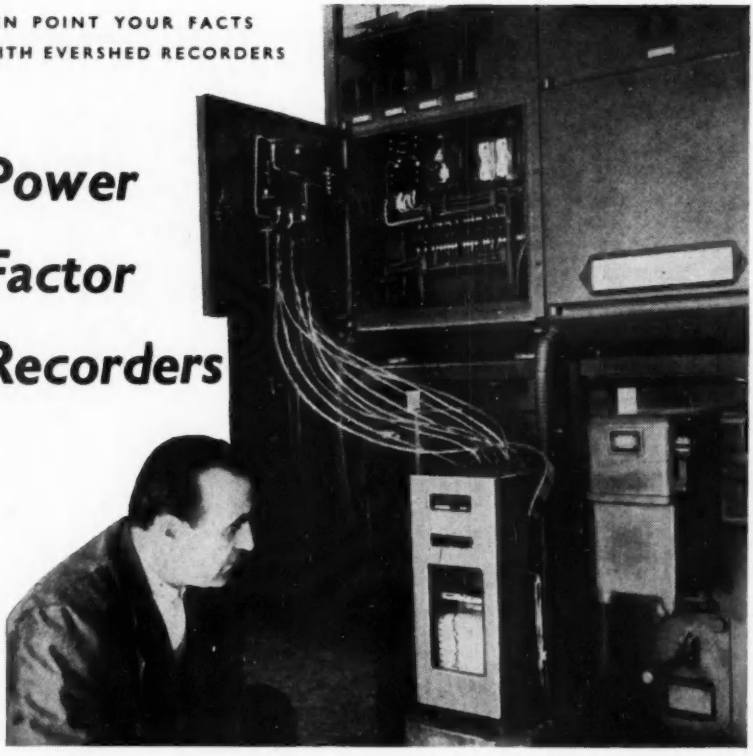
WITH EVERSHED RECORDERS

Power Factor Recorders



In order to lower the cost per kilowatt of station capacity, power companies throughout the world, such as the Athens Piraeus Electric Co. Ltd., have installed Evershed recorders as illustrated. These instruments keep a permanent, 24 hour a day check on the power factor and enable the company to ascertain if any overloading is due to low power factor.

Evershed recorders have a wide range of application. There are instruments for measuring electrical quantities such as current, pressure, power, frequency. Mechanical quantities such as water levels, gas holder stock and speed can be recorded equally well. Single or multi-pen, switchboard or portable instruments available.

Please write to us for Publication J 222

EVERSHED PERMANENT CHART RECORDS FOR INDUSTRY

EVERSHED AND VIGNOLES LTD. ACTON LANE WORKS, CHISWICK, LONDON, W.4

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6/46

The Danfoss line of controls for refrigeration plants is known through years of experience in this country.

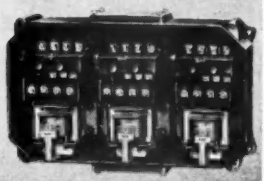
THE *Danfoss* CONTACTOR STARTERS

Now on the British Market-

For Wall Mounting

Water-tight Design

15 A Contactor Starters with overload protection



Star-Delta Switches, Reversers and Pole Changers for 15 and 65 A.

Triple-pole 15 A Manual Motor Starters

For Panel Mounting

Dust-tight Design

65 A Contactor Starters with overload protection

15 and 65 A Contactors

Contact our London Branch Office

Danfoss Manufacturing Company

69 - Victoria Street, London S.W.1
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MAN-MADE FLASHOVERS THAT IMPROVE DESIGN

TT

In a milli-second moment the finger of fire that leaps between the horns can bring months of theory crashing down to earth, or reveal a further step forward on the road to improved design.

Patiently, thoroughly, consistently, these tests are made - patiently, thoroughly, their records are studied, consistently advancing design. And the proof of these constant developments is seen wherever high voltage lines carry electricity across the continents - recognised in the world-wide reputation they have earned for Taylor Tunnicliff as Masters of Porcelain Insulation.

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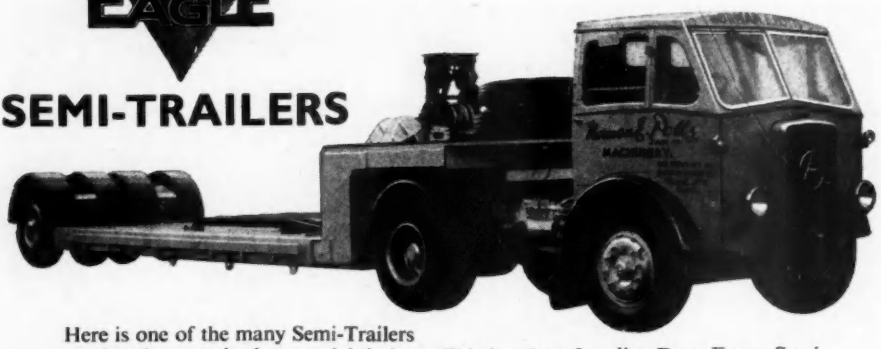
EAGLE

SEMI-TRAILERS



Here is one of the many Semi-Trailers produced to standard or special designs. This is a Low Loading Drop Frame Semi-Trailer with detachable rear axle for end loading and equipped with a 4-ton winch. The Semi-Trailer is supplied with loose bollards for slinging on ship boards with accurate balance marks to permit the vehicle to be slung unladen or loaded.

Can we help you on that Semi-Trailer problem?

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ELECTRO-MECHANICAL OPERATION with SEQUENCE CONTROL

Improvements Over Manual Operations

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Clyde BLOWERS Ltd

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'Phone: CLYDEBANK 1576/77 'Grams: 'MURWILS, GLASGOW'

Tension by Torsion

7th September 19
Dear Sirs,
We have despatched under separate cover four lengths
of Pyrotenax which we think will be of interest to you.
This was supplying current to one of our machines by
passing through a hollow shaft which was stationary, the
cylinder revolving around it, the four cables being separate.
following a bearing failure the shaft commenced to revolve
much to the discomfiture of the cables which did not fail
until they had pulled the terminal glands out of the
junction box fracturing the top of same.
On test the cable still showed continuity and perfect
insulation. We think that this demonstrates the toughness
and reliability of Pyrotenax. The damage of the cables was
brought about in trying to get them out of the hollow shaft.
Yours faithfully,
for
Chief Engineer.

This letter from one large-scale Pyrotenax user speaks for itself—and speaks well for Pyrotenax, too. Seldom is Pyrotenax put to such a severe test, but nevertheless the inherent toughness that enabled Pyrotenax to withstand such treatment is a valuable asset where cable must be exposed to danger of maltreatment for any reason. Fire-resistant, and virtually everlasting, Pyrotenax—the only mineral insulated copper covered cable—requires no replacement under normal conditions, and is easily installed in factories and works equipment of all kinds.

This is an authentic letter. The original signed copy on our customer's letter heading and the twisted cable itself may be seen at our Hebburn Works.

Pyrotenax

COPPER COVERED · MINERAL INSULATED CABLES

ELECTRIC CABLES FOR INDOOR AND OUTDOOR WIRING

For installations in Factories, Oil Refineries, Steel, Textile and Paper Mills, Chemical Works, etc.

"Pyrotenax" is an exclusive trade mark name, and must only be used to designate cables and other products manufactured by this company and its associates.

PYROTENAX LIMITED, HEBBURN-ON-TYNE PHONE: HEBBURN 32244-7

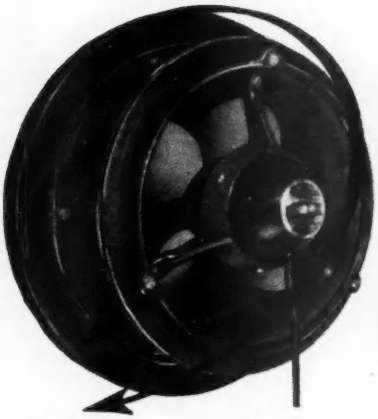
LONDON: Abbey 1654/5. BIRMINGHAM: Midland 1265. GLASGOW: Central 2238. MANCHESTER: Blackfriars 6946

GD58

Ventilation
by
FENTON, BYRN & Co LTD

THE WINDOW FAN . . .

silent in operation, it has a delivery of 20,000 cu. ft. per hour at 1,200 r.p.m. Can be fitted with a special light-proof attachment and is particularly suitable for the ventilation of Dark Rooms. Available for A.C. or D.C. supply. Size 9″.



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RVII

RADIOVISOR type "Q" Photo-Electric Relay is *versatile*–

It can be used to control a wide variety of industrial operations accurately and economically. Operation is instantaneous; normally the relay operates when the light to the photo-cell is interrupted, but this operation is easily reversed. Delayed action can be incorporated.

The equipment comprises a Control Unit of pressed steel, housing a photo-electric cell and single thermionic valve amplifier. Total consumption of the unit (excluding light source) does not exceed 10 watts, and it is suitable for operation from 200/250 AC supply. Write for full details.

RADIOVISOR EQUIPMENTS INCLUDE:—
Flamestat Flame Failure Control · Hopper and Bunker Level Control · Protective Guard Ray · Automatic Radiation Pyrometer · Factory and Street Lighting Control · Counting and Batching Unit · Print Registration · Smoke Detector Fire Alarm · Invisible Ray Burglar Alarm · Press Brake Guard Ray · Industrial Smoke Density Indicator.

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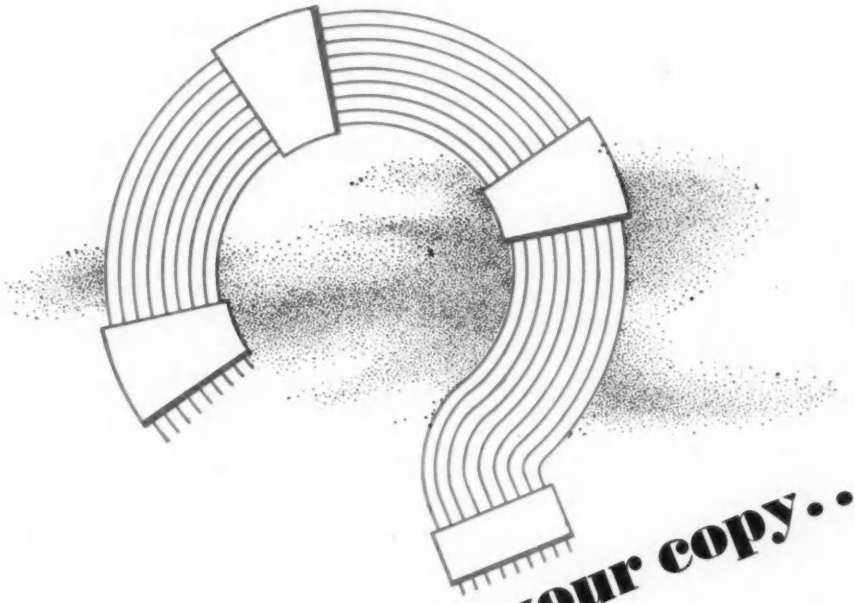

Have you had your copy..

...of "BUSBARS"; BICC Publication No.304W. It shows typical installations carried out by BICC who make Busbars in Copper and Aluminium to British, American and other recognised standards. Send for your copy to-day.

B.I. Callender's BUSBARS

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2

THE COMPLETE ANSWER!

Why you should specify Tudor batteries for switch operating and emergency duties

1 Exceptionally long life when maintained on continuous trickle charge at 2.3 volts per cell.

2 No gassing when maintained on continuous trickle charge, and therefore no corrosive action on adjacent equipment.

3 Low open circuit losses compensated by trickle charge.

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6 Can be discharged at any rate, even up to short circuit, without damage to battery plates.

7 Will operate satisfactorily in wide extremes of temperature.

8 Glass box assembly enables quick visual observation of plates.

9 No insulation problem with glass boxes.

10 State of charge and discharge readily obtainable.

Tudor Engineers will be pleased to prepare a specification of the most economical battery scheme to meet your requirements. Full details of Tudor switch operating battery schemes are given in Publication No. 100, *copies of which are available on request.*

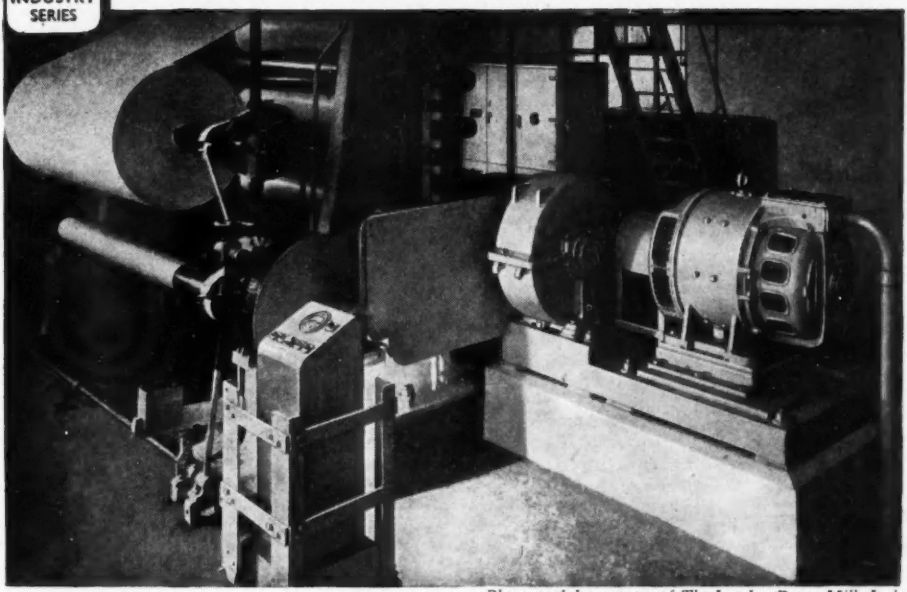
Tudor BATTERIES

THE TUDOR ACCUMULATOR COMPANY LTD · 50 GROSVENOR GARDENS · LONDON · SW1

T.115

N° 2
NEVELIN FOCUS ON INDUSTRY SERIES

Variable Speed Drives—



Photograph by courtesy of The London Paper Mills Ltd.

... and the PAPER INDUSTRY

The illustration shows Nevelin "Varionic Drive" equipment driving a Super-Calender machine at the Dartford works of The London Paper Mills Ltd. The drive is rated at 100 H.P., 1200 r.p.m., and can run continuously at any speed down to 400 r.p.m. and crawl intermittently at 60 r.p.m. Smooth acceleration with absence of snatch is a most valuable feature and many hundreds of machines in the Paper Industry are being made more productive at lower cost through the application of Nevelin "Varionic Drive".

When it's a question of
Variable Speed drives from A.C. mains—ask

'Nevelin' ELECTRIC · CO · LTD
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TELEPHONE: CROYDON 2268 TELEGRAMS: NEVELIN, CROYDON

A 'Lancashire Dynamo' Company N/7A

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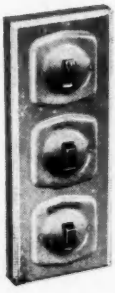

The modern quest for beauty in everyday things demands that switches and similar fitments of a utilitarian character should blend with the general decorative scheme of the room in which they are fitted—an excellent reason why discerning contractors prefer to install Tenby switches.

Tenby Pilot

Tenby ELECTRICAL ACCESSORIES

Manufactured by

S. O. BOWKER LTD.

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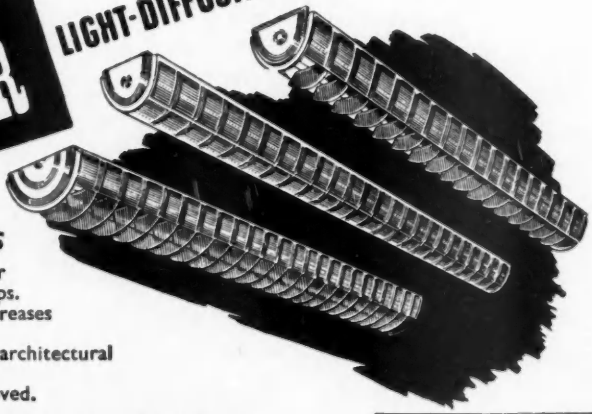
LIGHT-DIFFUSING SCREENS AND FITTINGS

World patents pending



DIFFLUOR SCREENS

- ★ Crystal prismatic screens for all standard fluorescent lamps.
- ★ Addition of these screens increases floor luminosity.
- ★ Can be arranged to suit any architectural design.
- ★ Instantly attached and removed.

SEPARATE SCREENS OR COMPLETE FITTINGS SUPPLIED

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Ask also for particulars of **PLEXILUX** *shadowless multiple tube fittings*

Proved under

IMPULSES

Electrical impulse tests in the companys laboratories taken on routine samples ensure that our cables
WILL NOT FAIL in service

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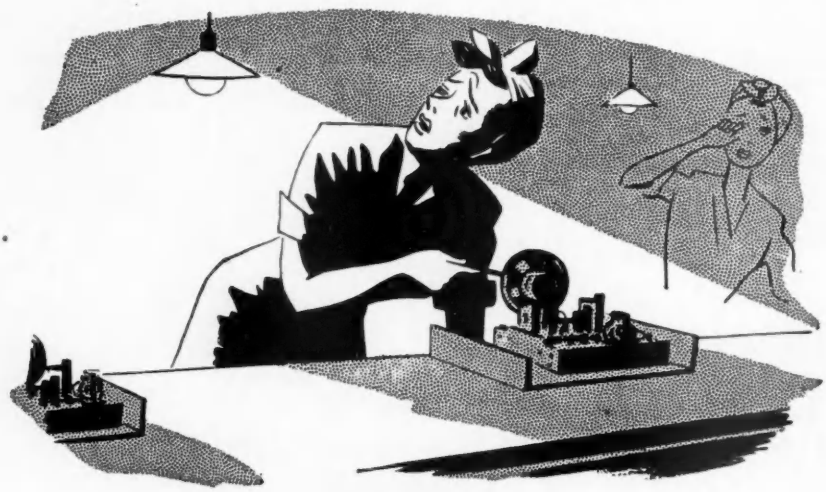
NEBULOSITY*

*The state of being clouded

on the production line



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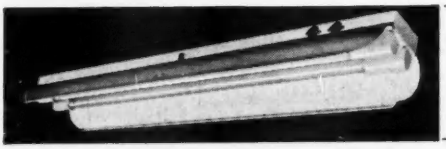
SLOW OUTPUT · CARELESS WORKMANSHIP · LOW MORALE

NOBODY can be expected to do a good job when straining to see his or her work. That's why, in factories of every type, the installation of first-rate modern lighting equipment is nearly always followed by an increase in the quality and quantity of production. With Philips planned fluorescent lighting each worker has the right light for the job, a clear, glare-free light that makes everyone happy — management and operatives alike.

PHILIPS

Consult



Two 80w. 5 ft. Philips fluorescent lamps installed in the "Axbridge" fitting. Other suitable factory fittings: "Ardingley", "Alness".

PHILIPS ELECTRICAL LIMITED

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FOR ALL ELECTRO-DEPOSITION PROCESSES

Rectifier style R.O.P. 7/4000
output 7 volts 4,000 amperes

"Westalite" rectifiers are today supplying millions of amperes for all electro-deposition and allied processes, and are world renowned as dependable sources of D.C. power. Whatever the process and the power required, manual or automatic control, "Westalite" oil-immersed or air cooled equipments will meet your every need. They are static in operation. Maintenance is nil. Running costs are reduced to a minimum. Their high overall efficiency is maintained at a high value right down to the lightest load. Everything that is essential for good plating will be found in....

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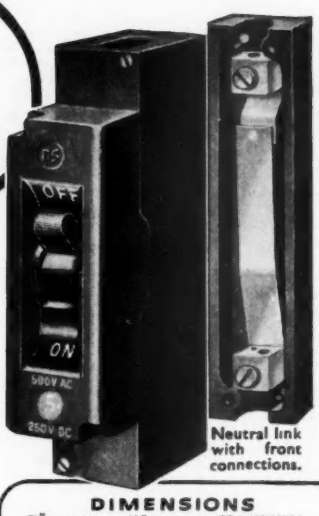
Introducing **DORMAN**
MINIATURE
CIRCUIT BREAKERS



Neutral link with front connections.

TESTED BY THE NATIONAL PHYSICAL LABORATORY

Designed to give unfailing protection to all types of electrical circuits and equipment up to a maximum current rating of 50 amps at 500 V a.c. or 250 V d.c. On ordinary overloads tripping may be instantaneous or have an inverse time delay characteristic, but in all cases instantaneous tripping occurs on a large overload or short circuit. The mechanism is normally sealed to prevent interference with settings. Neutral mechanism designed as a separate unit, to be fitted underneath the main unit when required.

Complies with the requirements of Lloyd's Register of Shipping.

ORDSAL

DIMENSIONS
5" Length x 1⅝" Width x 3" MAXIMUM PROJECTION

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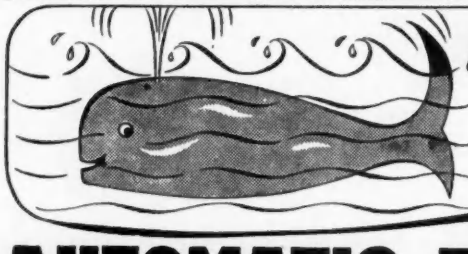


Works under Water!

AUTOMATIC PUMP

- ★ THE PUMP IS COMPLETELY AUTOMATIC
- ★ NO MAINTENANCE NEEDED
- ★ LOW RUNNING COSTS
- ★ MERELY PLACE IN FLOOR SUMP

Ideal for flooded basements, beer cellars, etc. It operates with a 4½-in. rise or fall of water in the sump, or can be completely submerged in water. Requires no elaborate fitting. The Davenset Automatic Pump will run continuously for 3 or 4 hours on one unit of electricity. Designed to operate against a maximum head of 20 ft.

DAVENSET

ANOTHER DAVENSET PRODUCT:
—BUILT FROM THE FIRST—TO LAST

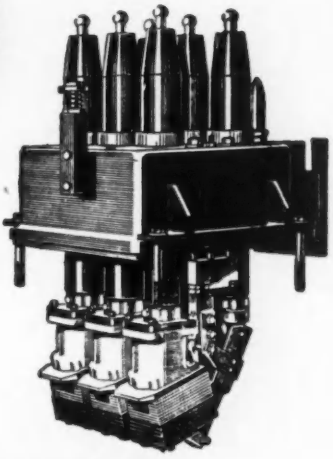
For further details write to :—

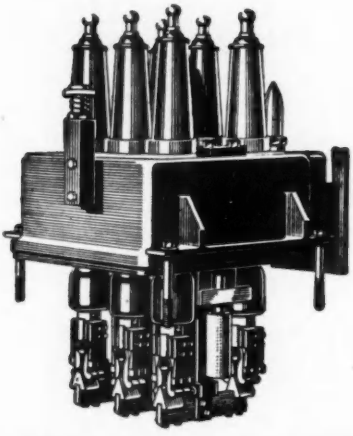
PARTRIDGE WILSON & CO LTD. DAVENSET ELECTRICAL WORKS, LEICESTER. 5

INTERCHANGEABLE BREAKERS

THE TRINAL
ARC-CONTROL BREAKER

250 MVA AT 6·6 AND 11kV (ASTA Certified)



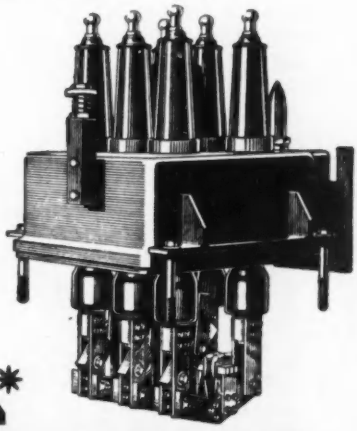


THE TRINAL
PLAIN-BREAK BREAKER

150 MVA AT 6·6 AND 11 kV (ASTA Certified)

THE TRINAL OIL-SWITCH

TESTED TO B.S.116/1937—WITH ADDITIONAL
M-3-M TEST AT 250 MVA, 6·6 kV.



FORM THE J.&P. TRINAL* RANGE

—the latest advance in switchgear standardisation

All three units are of similar dimensions and have common fixings. They can be accommodated in standard J. & P. metalclad, truck or cubicle housings all of which are rated at 250 MVA at 6·6 kV or 11 kV. Hence a board supplied for a system rated at 150 MVA can easily be converted on site to 250 MVA rating by the substitution of higher rated breakers.

* The "three-fold" range that can save you pounds and pounds through interchangeability. Full details in Publication SG 86

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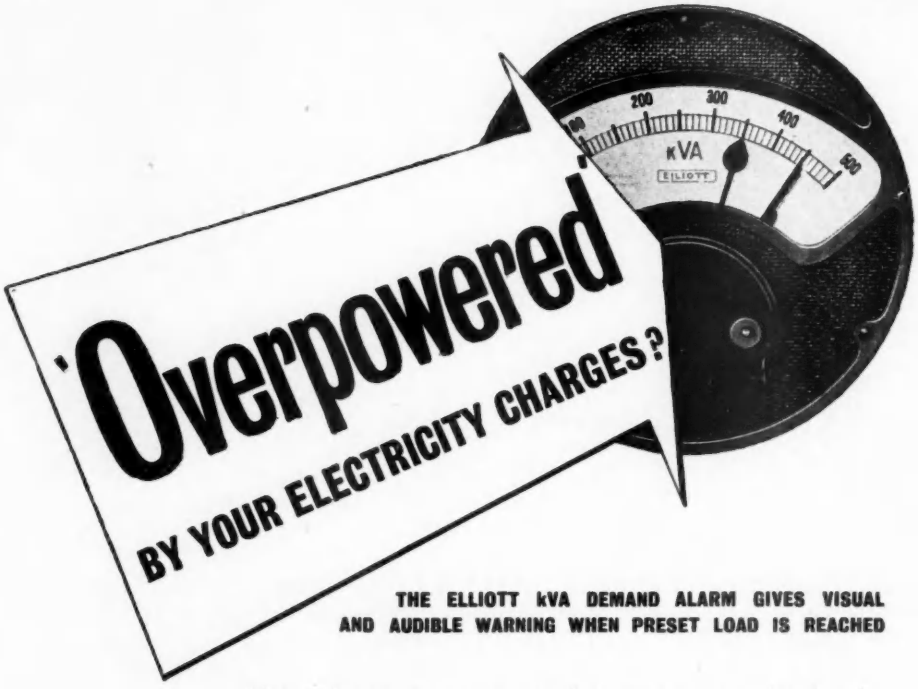

THE ELLIOTT kVA DEMAND ALARM GIVES VISUAL AND AUDIBLE WARNING WHEN PRESET LOAD IS REACHED

Now, keep an eye—and an ear—on the load with this new, convenient alarm system. The equipment provides (*a*) an indication and/or a graphic record of the instantaneous load in kVA. This can be installed wherever you wish—for example, in the plant engineer's office. (*b*) A warning by bell or klaxon when the load approaches the target demand. The Elliott kVA Alarm System is easy to install and needs no maintenance. Equipment is available for single phase, and 2 and 3 phase balanced and unbalanced loads. Full details on request.

ELLIOTT **kVA DEMAND ALARM**

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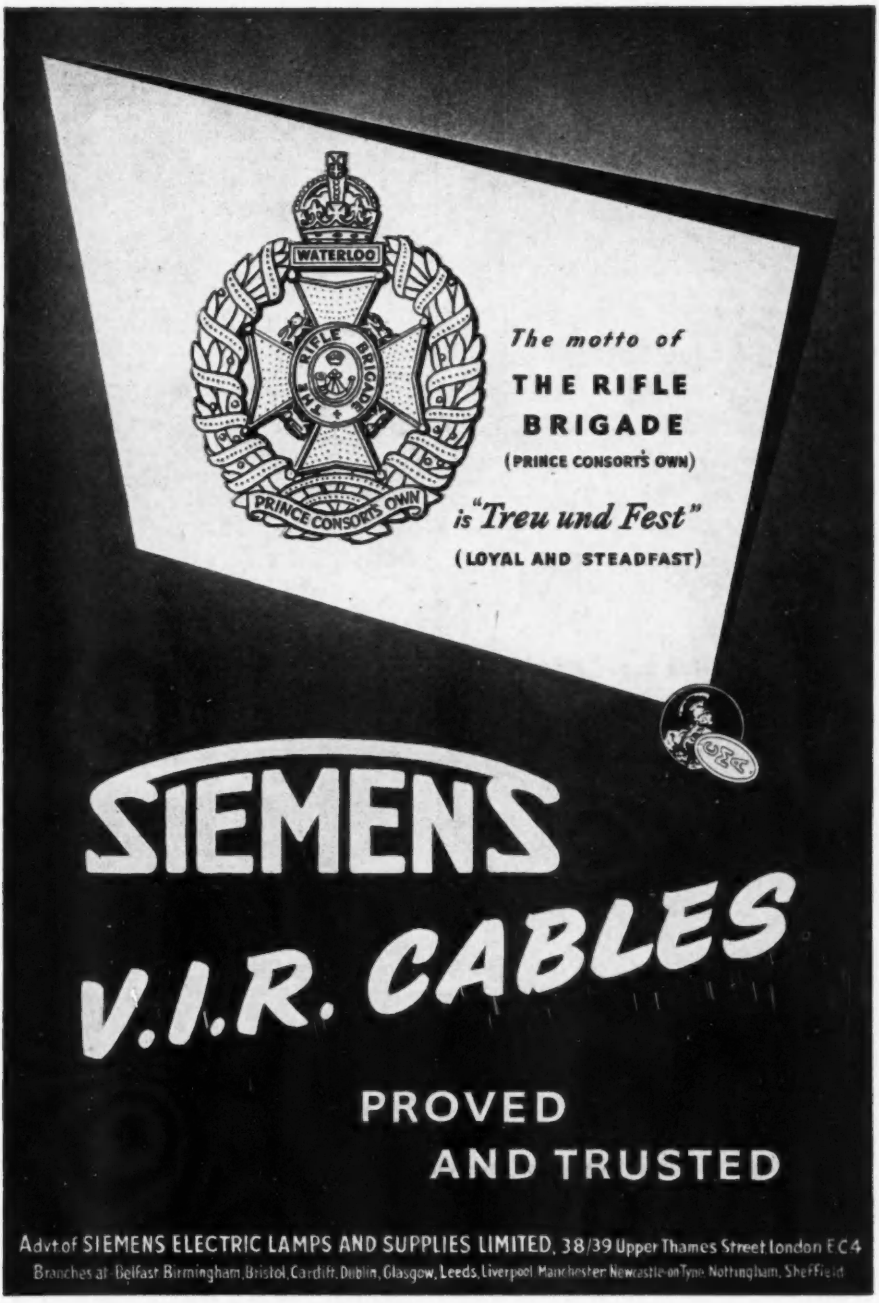
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The motto of
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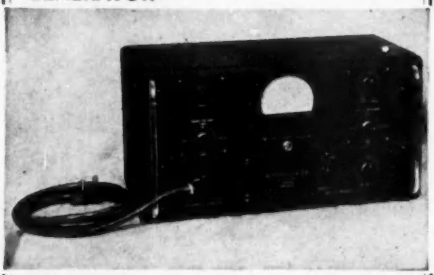

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- Depth Measurement
- Pipe Line Tracing
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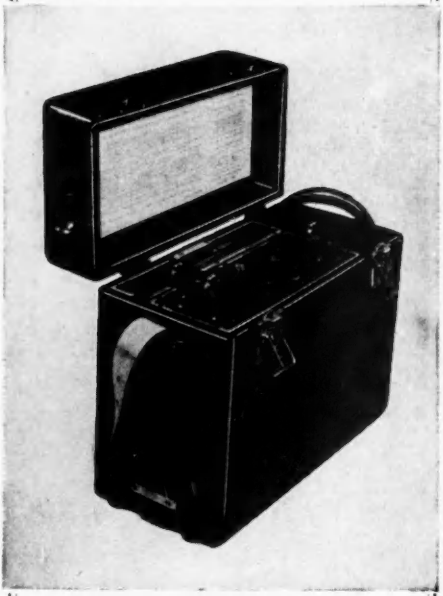

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OF ALL TYPES
Both Paper & Mica

Large stocks available for immediate delivery. Your specific enquiries, giving full details, will receive immediate attention.
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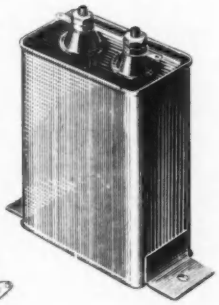

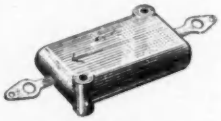

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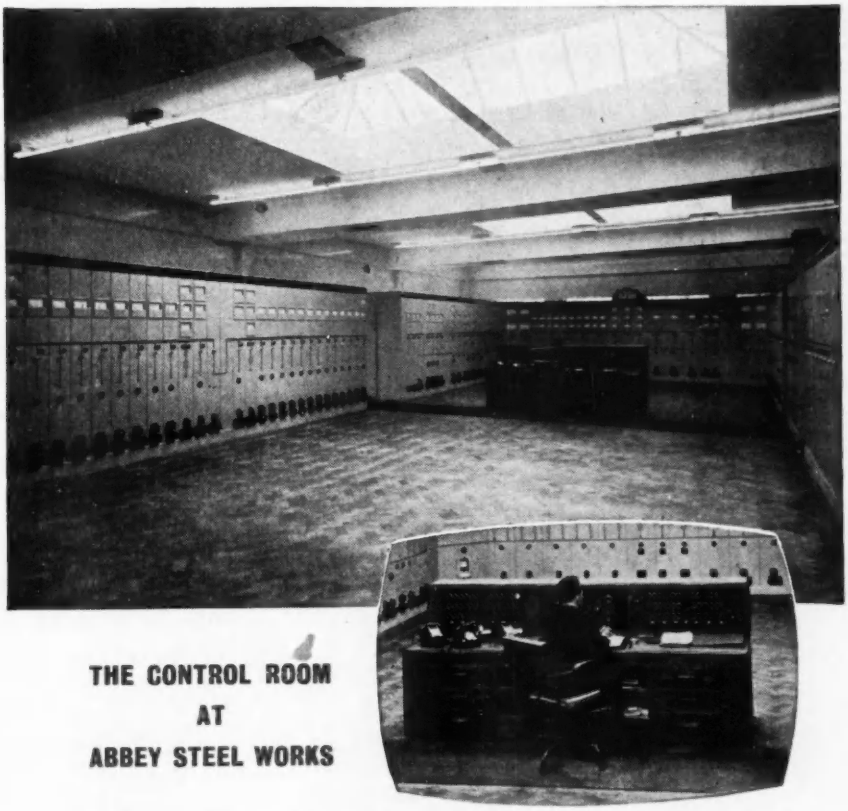
★ *If you want to talk switchgear . . . talk to Reyrolle*



THE CONTROL ROOM AT ABBEY STEEL WORKS

The control room at Abbey Works, with Reyrolle switchboards for the remotely controlled switchgear in the Works, is a good example of an industrial installation. The instruments have clean, open and readable scales with well defined pointers. The control switches are simple to operate. The system diagram with its mimic semaphores reproduces the switching conditions faithfully.

All apparatus not required for control purposes is dissociated from the panels and the colour scheme both for the panels and the control room is carefully selected to create a pleasing and restful atmosphere.

If you want to talk switchgear

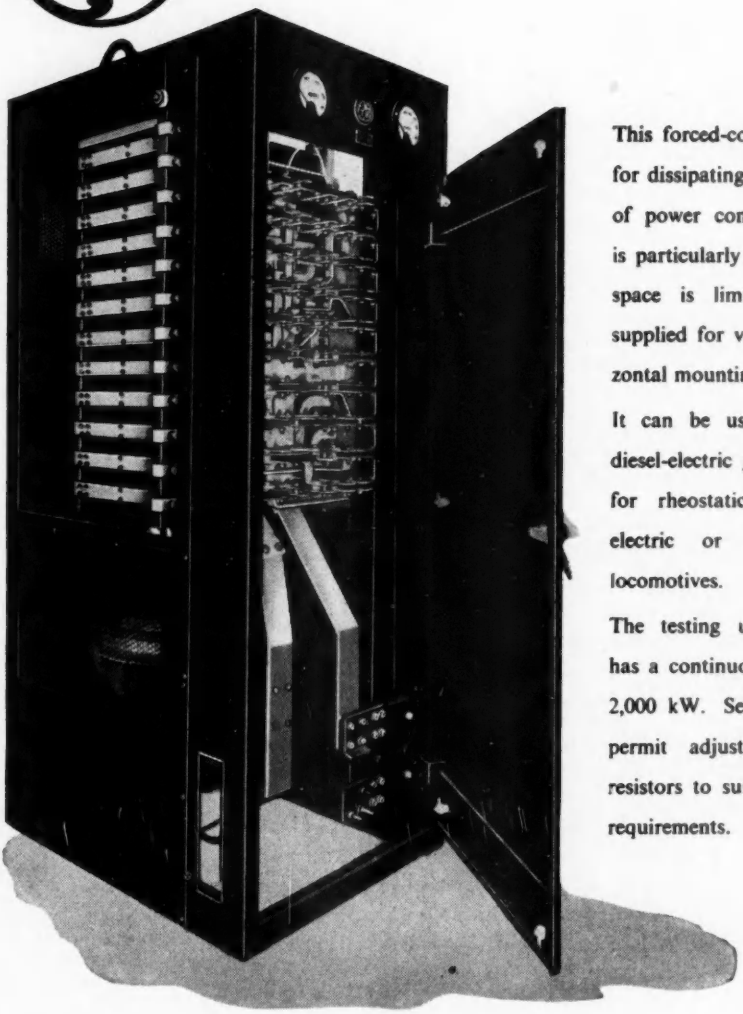
. . . talk to Reyrolle

A. Reyrolle & Company Ltd., Hebburn, Co. Durham

CRC 215

B T-H

TYPE ZP RESISTOR



This forced-cooled resistor is for dissipating large amounts of power continuously, and is particularly suitable where space is limited — can be supplied for vertical or horizontal mounting.

It can be used for testing diesel-electric generators and for rheostatic braking on electric or diesel - electric locomotives.

The testing unit illustrated has a continuous capacity of 2,000 kW. Selector switches permit adjustment of the resistors to suit varying load requirements.

THE
BRITISH THOMSON-HOUSTON
COMPANY LIMITED, RUGBY, ENGLAND

Member of the AEI group of companies

A4315

REASONS WHY

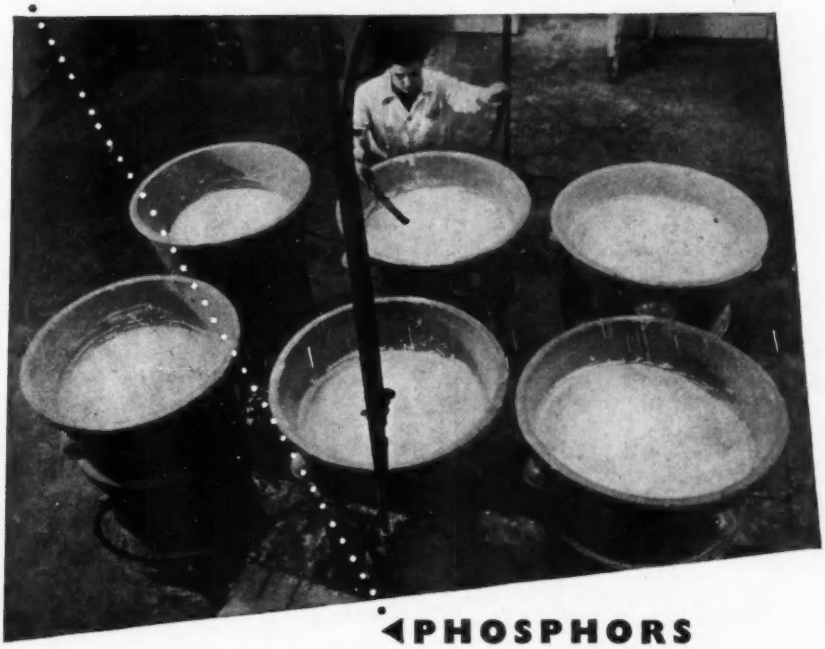
ATLAS FLUORESCENT

IS SUPREME

Three things finally decide the efficiency of a fluorescent lamp—the controlled purity, the uniform particle size and the even distribution of the phosphor coating on the inside of the tube.

It is these phosphors—with their peculiar ability to absorb ultra-violet energy and to radiate it as visual light—which make flourescent lamps possible.

Phosphors used in ATLAS lamps are made *exclusively* in our factory at Enfield adjacent to the lamp producing plant. Only in this way is it possible to ensure the close control essential to the consistent 5,000 hour performance of all ATLAS "Double Life" lamps.



PHOSPHORS

Thorn THORN ELECTRICAL INDUSTRIES LTD., LIGHTING DIVISION, 233 SHAFTESBURY AVE., LONDON, W.C.2

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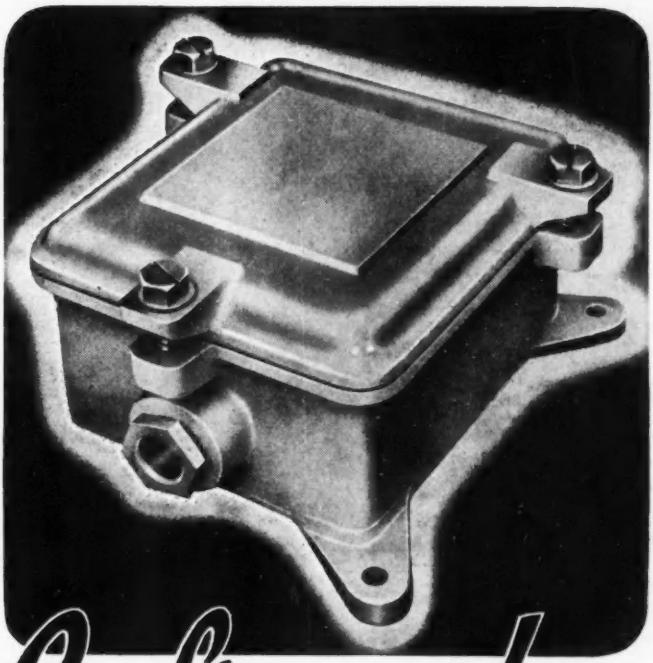
CAN BE INSTALLED FOR THE COST OF A TYPIST'S SALARY FOR ONE WEEK

Easy to understand, simple to operate and as foolproof as any system can be. Fits most cabinets and desks.

Write for particulars to:—RONEO LTD., 17 SOUTHAMPTON ROW, LONDON, W.C.1

TRW 148

The Royal Navy and Foster standards of



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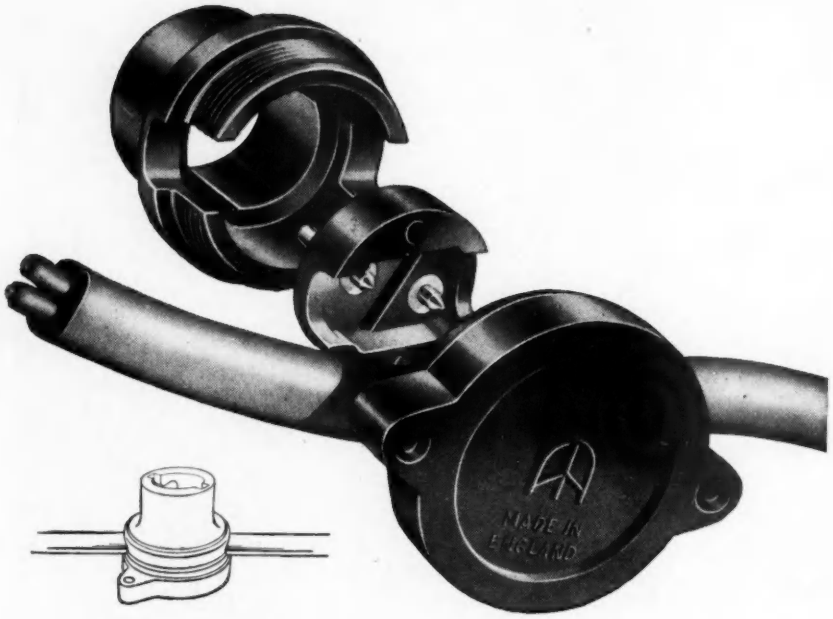

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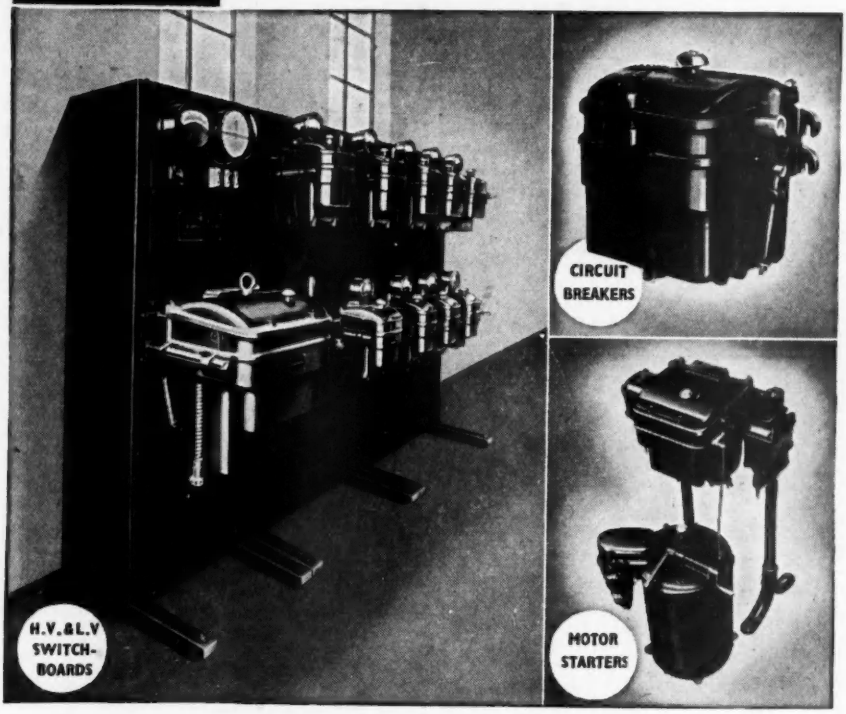

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ELECTRICAL TIMES

Vol. 121 No. 3155 THURSDAY, 24 APRIL, 1952

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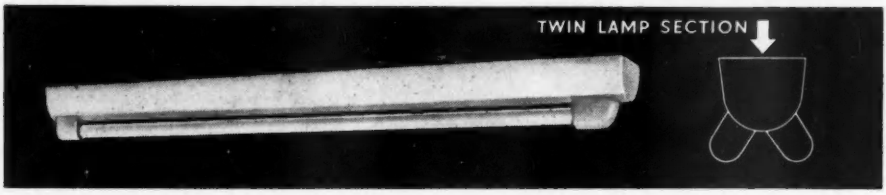

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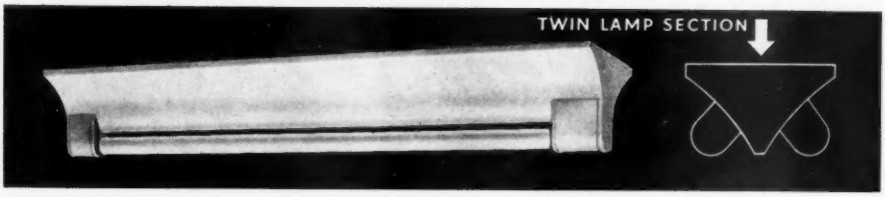

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Editorial

B.E.A. BORROWING

THE recent upward trend of the gilt-edged market is no doubt being closely watched by the B.E.A., for their temporary borrowing is fast nearing the limit where a new issue of stock becomes necessary. To add further impetus to this possibility, comes the report that banks are likely in May to raise their rate for overdrafts to nationalised industries to 4%; so no longer will they have the advantage of a low rate for short term borrowing. At the present time the Treasury guarantee on bank advances is £140 million. It was raised from £120 million on March 26 and has a currency for the unusually short period of one month. Consequently, a loan of at least £150 million would have to be raised; this would be the same amount raised on their last issue in May, 1950. A flotation of this order would be the largest since the raising of the bank rate to 4% and in consequence there is some uncertainty as to market reactions to such an amount. One thing is certain, however, the B.E.A. will have to pay more for their capital. At present prices, existing B.E.A. stocks give a yield of 4½% to maturity but with the necessity for financing the plant programme on the most favourable terms, there is obviously considerable room for speculation on what terms the Treasury will eventually agree for any new loan.

As we go to press it is learned that the B.E.A. will float a £150 million issue at 4¼%, issued at £99, redeemable 1974-79.

REGULATIONS CAN DATE

STATUTORY safety regulations can work effectively for many years provided they are drawn up in terms wide enough to allow administering inspectorate to adjust their interpretation to developing needs. Eventually, however, the original wording of the regulations has to be strained to bear the new construction laid upon it. Then the time should have arrived for radical revision. Attention is drawn to this need by the report of H.M. Deputy Chief Inspector of Mines on an explosion which occurred last July at a Durham colliery. This accident was traced to faulty electrical equipment, and to a situation which the 1913 regulations for electricity in mines did not adequately cover. Had revised regulations, which have existed in draft form since 1940, been in force, the trouble might well have been averted. It is, of course, easy to find reasons why there is delay in making new regulations mandatory. The post-war financial and materials position has weighed against the practicability of making the changes that might be called for, and a period of intensive experiment has occurred which encourages delay in codification, so that rules may not be out of date as soon as completed. There does, none the less, seem to be good reason to press for an early revision of existing regulations to bring them more easily into line with present-day practice and ideas.

PROGNOSIS FOR ELECTRICS

INCREASED tax on petrol has combined with the shortage of commercial motor vehicles to give impetus to the use of battery electric vans in recent years, particularly for such purposes as retail distribution. It is naturally important to determine how far this intensified interest is likely to be permanent, and a valuable attempt at such an evaluation was made at the I.E.E. last Thursday. Although on a basis of fuel costs alone—including the battery as consumable fuel—the advantage is with electric traction, this is not likely to be the deciding factor in determining the future popularity of the battery electric vehicle. More important, as in most electrical applications today, is the way this type of vehicle can keep down labour costs, by effectively increasing productivity. If the cost of wages goes so high that retail deliveries are severely restricted,

then the most promising field for expansion has been lost. Any situation short of this, however, should augur well for manufacturers, though how the resulting market will split between the conventional van and the increasingly popular pedestrian-controlled vehicle remains a matter for surmise. Unfortunately, even on the most optimistic calculations, the demand for electric vehicles is unlikely to grow to a size at which manufacturing technique will make drastic price reductions possible, with removal of the first-cost objection which does so much to limit sales.

TAILORED FOR A BATTERY

DURING the discussion of the papers on battery vehicles, one of the most hotly contested points was the agreement of both authors that there was no case for using alkaline batteries in electric road vehicles. The bogy of higher first cost and the technical consideration of higher internal resistance, leading to slower hill-climbing speeds, were put forward as good reasons for avoiding the alkaline battery, but those who took part in the discussion emphasised the longer life and advantageous weight of nickel-iron and similar types of battery. Probably the most interesting suggestion made in this connection was that the difficulty of obtaining British supplies of suitable batteries of this type had led vehicle designers to concentrate their attention on motors and control gear suitable for lead-acid units. To work at their greatest efficiency, alkaline cells would need a different basis of electrical design, and if this were secured, it was said, much of their apparent technical inferiority might disappear. This is an interesting technical point of which more might well be heard.

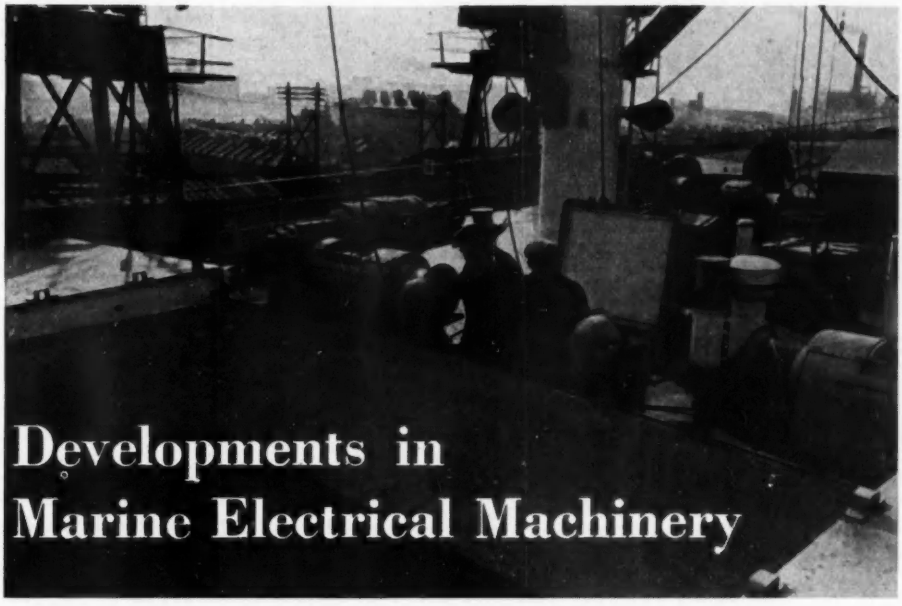
TANKERS LEAD AGAIN

ELECTRICITY on board ship has progressed a long way since it was first used for saloon lighting in 1879. Nowadays its use for many other important auxiliaries is commonplace, while there is an increasing number of vessels in which electrical methods are used for the main propulsion power transmission. Some of the more important developments of recent years are described in an article which we print on page 745 of this week's issue, and in this story one fact of particular interest stands out. When in the early days of shipboard electrification, electric power spread from lighting alone to take over pump drive and ventilating duties, it was the tanker type of vessel in which the greatest progress was achieved, safety considerations making electric drives especially suitable. Now that the subject of d.c. versus a.c. distribution is the liveliest topic, it is once more the tanker that is leading the way in the application of the newer method to British mercantile marine, though this time the reason is the simpler one of different cargo handling requirements. Oil does not require the variable speed winches that are the main difficulty on a.c.

BIG AND SMALL

JUST as scientific research tends to widen the limits of human knowledge in the subatomic sphere at one end and in interstellar space at the other, so commercial development also expands towards both the very large and the very small. While the demands of an ever more complex civilisation lead to larger machinery and equipment, so it requires, also, components of ever smaller dimensions. This was well demonstrated at the recent R.E.C.M.F. exhibition, where the diminutive size of some of the components attracted particular attention. Are these two trends, towards both the larger and smaller limits, an inevitable concomitant of progress? Certainly they can be traced back through many centuries. On the other hand, the demand for ever smaller radio components is certainly a natural result of their more specialised applications and the greater complexity of the circuitary now being employed, which would lead to over-large equipment without the smaller components available today. Theoretically, at least, there must be a lower limit to size, but this year's exhibition suggests that it is still some distance off.

Meteor



Developments in Marine Electrical Machinery

THE VITAL ROLE OF ELECTRICITY AT SEA

By PETER LAWRIE, M.I.Mar.E.

THE use of electricity in ships of all classes has been firmly established for many years. At the beginning of the present century few ships used it for any other purpose than lighting, but it is now applied to a wide range of uses ranging from the driving of main propulsion motors of 13,000 s.h.p. down to the operation of delicate navigational instruments.

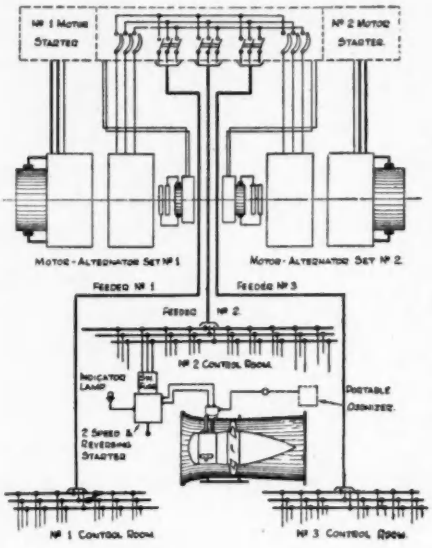
Main Propulsion

Main propulsion, of course, is the most spectacular use of electricity aboard ship and brief particulars of two modern installations may prove to be not without interest. The first vessel chosen is the *Auris*, an oil tanker owned by the Anglo-Saxon Petroleum Company. Although, perhaps, not the most recent vessel to be equipped with electric propulsion, the *Auris* is of particular interest as the engine-room auxiliaries are operated by a.c. current and she is the first merchant ship to be equipped with a gas turbine-driven alternator.

When first commissioned, the propelling machinery of the *Auris* consisted of four 8-cylinder Hawthorn-Sulzer diesel engines each coupled to an alternator supplying current to a single propulsion motor delivering 3,750 s.h.p. at 120 r.p.m. and to the propulsion auxiliaries. Towards the end of last year, one of the main diesel engines was replaced by a gas turbine but the electrical equipment, except for minor adjustments, remains as originally installed. The four engines and alternators are arranged at floor level with the electrical control gear on a flat above the alternators at the forward end of the engine room. The main propulsion motor is in a separate compartment immediately aft of the engine room.

All the propulsion auxiliaries are driven by a.c. motors, their speed varying directly with the engine speed. An electrical governor controls the engine speed within fine limits from half to full speed and a mechanical governor safeguards against overspeed, should the electrical system become de-energised.

Alternators are of the salient pole, 3-phase double unit design with independent field and a.c. windings normally operated in series. The polarity of one half can be reversed in order that switching can be effected at zero voltage. Each alternator has a capacity of 830 kVA and the current is 3-phase 50 cycles, at 1,600 V. Each alternator is arranged for forced air cooling. The propulsion motor is operated as a synchronous motor between full and half speeds. Below half speed the motor runs as



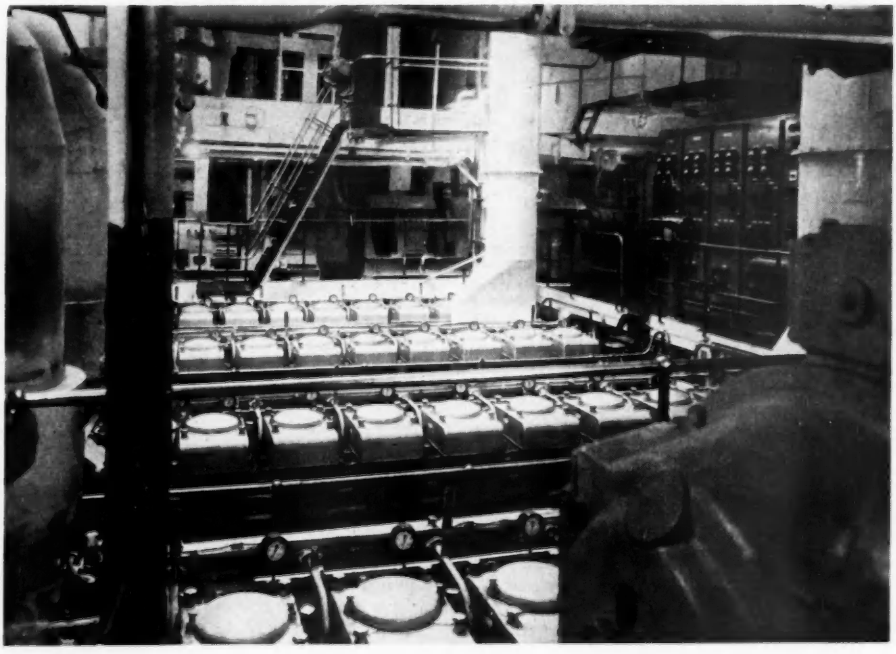
Diagrammatic arrangement of installation for driving a.c. fan motors in the "Hornby Grange." Below is seen the engine room of the Diesel electric tanker "Auris". One of the exciters may be seen in the background

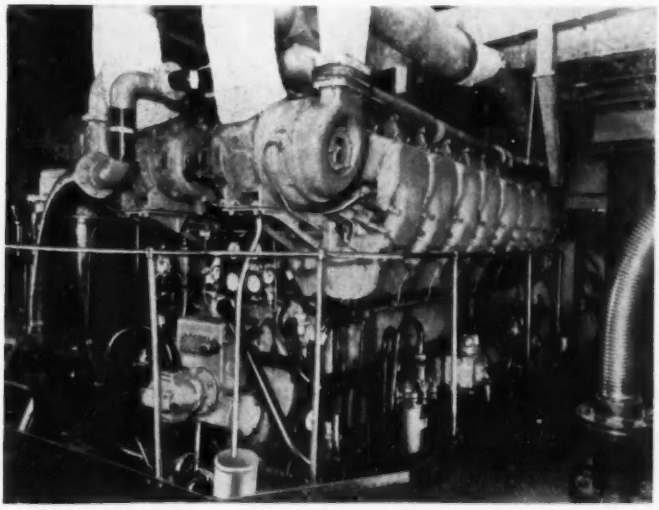
an induction machine with variable speed depending on the applied voltage. Two exciter motor generator sets are provided, one working and one standby, each set consisting of an a.c. motor direct coupled to a d.c. generator. Each exciter set also drives a d.c. generator of 30 kW at 110 V for constant voltage supply, enabling the entire propulsion and auxiliary requirements to be provided by the main engine-driven sets.

The complete electrical equipment and the gas turbine, were supplied by the British Thomson-Houston Company, Rugby.

Special Duty Ships

For special-duty ships, such as tugs, dredgers and ferries, d.c. diesel-electric drives offer a number of advantages. An interesting example of twin-screw diesel-electric propulsion concerns the suction dredger *M.O.P. 228-C*, the largest of a series of four vessels built by dredger builders in this country for the Argentine Government. In this case, the propelling machinery consists of four English Electric 16 SVM type diesel engines direct coupled to 770 kW, 220/230 volt d.c. generators. The generators are separately excited, graded gap, non-compensated machines of the single-bearing type. Power from the main generators is available for either propulsion or pumping.





Here is a view of one of the English Electric Type 16 SVA main engines and generators built for the Argentine Ministry of Public Works' dredger M.O.P. 228-C

When propelling the vessel at full power, all the four main generators supply the two 1,900 b.h.p. 250 r.p.m., 440 V propulsion motors, but when dredging, two of the generators supply the dredge pump motors which are each rated 950 b.h.p. at 220 r.p.m. The remaining two generators supply current for main propulsion.

Propulsion control equipment, located on a gallery athwartships, at the forward end of the engine room, acts as a tie between the various components of the propulsion electrical machinery and controls the flow of electrical power between them. The main control board, about 40 ft long has, in addition to the propulsion control panel, the four main generator set-up switches which connect the generators to either propulsion or pumping circuits. The set-up switches change over the main connections and simultaneously the fields of the main generators, so that these fields are supplied by the correct exciter set. These set-up switches are interlocked, both by the Castell system and mechanically, so that not more than two generators can be set up on the pumping circuit and thus prevent a generator being set up on both circuits simultaneously.

Cargo Vessels

In the case of cargo ships, where the expense of full diesel-electric propulsion equipment is considered uneconomical, the electro-magnetic slip coupling has been used successfully. This system, which enables two or more high-speed geared diesel engines to drive a single propeller shaft without transmitting torsional vibrations from the engine crankshaft to the gearing, was introduced by the Swedish ASEA company in 1937. A number of ships were fitted with these slip couplings, including the motor ships *Werna*, *Dagmar Salen*, *Astrid Thorden*, and *Astri*. The system did not find favour in this country at the time, but it was recently announced that the British Thomson-Houston Company is supplying two electro-magnetic slip couplings and a twin-pinion single-reduction gearbox for a 9,000 s.h.p. motorship under construction on the Clyde. These couplings are stated to be the largest ever built for marine use.

In construction, the coupling comprises two electro-magnets, the primary unit being mounted on one shaft and excited from the ship's d.c. supply, while the secondary unit is mounted on another shaft and excited inductively. The primary part is actually a multipolar magnet ring connected to the pinion shaft of the reduction gearing and the secondary part is provided with a short-circuited winding and connected to the shaft of the diesel engine. The two parts are thus overhung on their respective shafts and are separated by a radial air gap, there being no mechanical connection between them.

It is understood that five passenger and cargo liners of 5,250 tons gross, at present building in Italian shipyards, will be fitted with four diesel engines driving twin shafts through ASEA electro-magnetic slip couplings and reduction gearing.

Auxiliary Equipment

Limitation of space on board ship and the increasing use of electrical equipment often taxes the ingenuity of the designer to provide sufficient generator capacity. This was rather cleverly solved in the case of a number of large diesel-engined trawlers recently built at Goole for the Icelandic Government. In the design of these vessels, the problem of providing sufficient power for the large trawl winch was successfully overcome without the need for an additional auxiliary generator set which would have made the proposition impracticable by the extra space required. A system was evolved whereby the trawl winch generator is driven from the Ruston main engine through an isolating clutch.

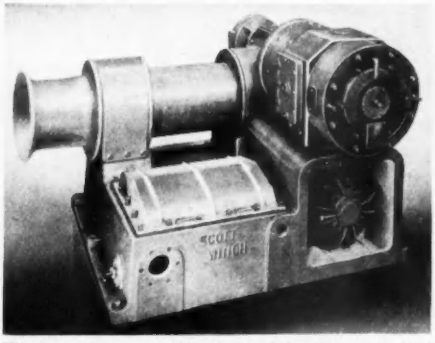
The Clarke Chapman trawl winch electrical equipment is of the conventional Ward Leonard type giving a drooping load speed characteristic and a safe stalled pull. It is specially arranged, however, for the two duties involved. Under fishing conditions at sea, the winch motor is supplied from the main Ward Leonard generator driven by the main engine. In port, however, where duties are not so onerous, the winch motor is supplied from one of the 50 kW auxiliary sets.

The same controller is used for either duty, the only operation necessary for changing over being to switch over the winch motor supply selector. The main Ward Leonard generator is provided with its own exciter but it can also be excited from the ship's mains, so that trawling can still be carried out in the event of a breakdown in the excitation.

No-volt protection is included so that in the event of failure in the excitation supply, the winch will shut down and the magnetic brake come on. This protection also ensures that the winch cannot be restarted until the control wheel has been returned to the "off" position, whether the stoppage is due to the failure of supply or the use of one of the emergency stop pushes. The no-volt circuit is also broken should the main motor supply selector be opened while the winch is running. The field circuits are broken before the mains and this prevents excessive arcing on the switch blades.

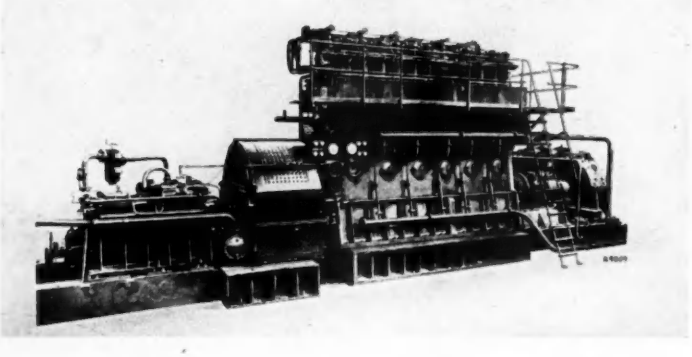
A.C. for Auxiliary Power

The possibility of using alternating current for driving the auxiliary machinery on board ship has been studied by marine engineers for some time, and in the American mercantile marine the use of a.c. current has made greater



The Scott Convertor Winch which has been supplied for use with a.c. supplies in ships

strides than in this country. One of the most important advantages of a.c. current is that squirrel-cage induction motors, the most reliable and simple type of motor known, may be used. These motors may be started by the simplest form of push-button starter, and even on large motors the controller is simpler than that for a d.c. motor of comparable rating. Other advantages include reliability and reduced maintenance and usually result in an



Ruston and Hornsby Diesel - electric set with special winch drive (rear end) for trawlers

Main dining saloon of the "Empress of Scotland" to show cold cathode lighting

overall saving of weight, space and also cost.

Unfortunately, adjustable speed, which is practically a necessity where marine auxiliaries such as winches, forced-draught fans and pumps are concerned, cannot be obtained with the squirrel-cage motor. Adjustable speeds may be obtained by wound-rotor motors, but this is accompanied by considerable power losses at the higher speeds.

Up to the present, the greatest drawback to the adoption of a.c. current on ships has been the lack of a satisfactory cargo winch and a number of electrical firms have put up proposals to overcome this difficulty. It seems likely that the oil tanker will be the first type of ship to use a.c. current extensively, simply because the cargo winch problem does not apply.

Within recent months, a number of British electrical firms have received large orders for a.c. electrical equipment for tankers. This includes motors for driving the main circulating pumps, induced and forced-draught fans, steering gear, oil purifiers and workshop machinery. Laurence, Scott and Electromotors Ltd., one of the firms participating in the contracts, are supplying their patent Trislot type of motor for driving the majority of the auxiliaries. This motor, which was described in the *Electrical Times* of June 1, 1950, takes a much lower starting current than the normal squirrel-cage motor and is particularly suitable for use where the alternator capacity is limited.

A recent example of the use of a.c. current in ships, is that of the cold-air circulation system in a number of large refrigerated cargo liners, where the air-circulating fans are driven by squirrel-cage motors. In the first of these vessels, the Houlder liner, *Hornby Grange*, practically the whole of the cargo-carrying spaces are refrigerated, these being divided into a number of small chambers. As a consequence, no fewer than 76 circulating fans and air-cooling batteries are fitted, the total power absorbed by the fans being approximately 136 h.p. There are no brine grids in these spaces and the highest degree of reliability is required from the fan motors. Running conditions, with low temperature and high relative humidity are not favourable and the positions in which the fans are fitted are of necessity somewhat awkward.

In the investigations made to determine whether the 3-phase squirrel-cage motor could be used, it was decided that two alternative fan speeds would meet the requirements of the refrigeration system if the lower speed were about 70% of the high running speed. It was also considered desirable to use the single-stage axial-flow type of fan in view of its reliability, coupled with the possibility of reversing the direction of air flow by reversing the motor without undue reduction of the rate of air circulation. These requirements could not be met with the usual supply frequency of 50 cycles per second, but the use of a frequency of 100 cycles provided a solution to the problem.

The fans run at alternative speeds of

approximately 2,930 and 1,950 r.p.m. or 1,950 and 1,450 r.p.m. according to their size and duty with the possibility of reversing at either speed. Fan motors are of the 3-phase, squirrel-cage type with dual wound stators, the speeds quoted being obtained by alternative 4- and 6-pole windings in the first case and 6- and 8-pole windings in the second case. The a.c. supply for the fan motors is obtained from two identical 230-V, 3-phase, 100-cycle alternators each rated 100 kVA at 0·78 power factor when running at 1,200 r.p.m. The alternators are driven by d.c. motors rated at 114 h.p. supplied with current from the ship's mains.

The fan-control gear is grouped in three control rooms, each serving two sets of refrigerated spaces. In view of the comparatively large number of fans to be controlled, and the strictly limited space available, the busbar type of construction has been adopted. Each fan motor is controlled by a four-position hand-operated, change-speed switch starter, arranged to provide two fan speeds—forward and reverse running being available with either speed, with direct-on-line switching in each case.

Cargo Winches

In cargo ships, the most important electrical auxiliary is probably the cargo winch and considerable improvements have been made in recent years both as regards its operation and maintenance. It is seldom possible to arrange the winches so that the operators can see into the hatch. As a result, in modern vessels the winches are placed in any convenient position and a remote control pillar is situated where the operator can best see into the hold.

As with all marine auxiliaries, maintenance is of great importance, so the modern trend is to arrange the winch contactors in a deck house where inspection or repair can be carried out in comfort. This arrangement, although more costly, is preferable to the usual procedure of mounting the contactors and resistances in watertight compartments alongside the winch, where regular inspection is dependent upon the weather.

Mention has previously been made of the a.c. cargo winch which is still in a state of evolution. It is of interest to note, however, that a number of Scott 5 convertor winches have been ordered for three ships building in France. The winch motor is the normal d.c. machine supplied with variable voltage from a light-weight motor generator accommodated in the bedplate. There are four speed steps in each direction, the speed of the fourth step automatically rising with light loads. Lowering is controlled by auto-dynamic braking and the mechanical brakes fitted include an overspeed brake and a magnetic disc brake to hold the load suspended.

Lighting

It is sometimes suggested that the shipowner is reluctant to adopt new ideas in his ships. Where fluorescent lighting is concerned, however, there has been little hesitation and the modern ships boast some of the finest installations to be seen anywhere. Even in cases where the ship was built before the advent of fluorescent lighting, this form of illumination has been installed in the public rooms to good effect.

Both hot cathode and cold cathode systems are used in ships, depending on the type favoured by the contractor. An apparent advantage of the cold cathode system is that the tubes may be bent into various shapes, thus allowing intricate designs to be carried out.

As an example of a vessel which has a modernised lighting system, the Canadian Pacific liner, *Empress of Scotland*, is of interest. Over 5,000 ft of Osram cold cathode tubing was used in the public rooms and except in feature fittings such as in the cocktail bar, where exposed coloured tubes are used, the fluorescent lighting is unobtrusive. Two 75 kVA motor alternators are installed in the engine room to convert the ship's 220 V d.c. supply to 230 V, 50 cycles a.c. for the cold cathode lighting.

Electrical manufacturers are always alive to the fact that equipment for ships must be robust and easily maintained and a number of really ingenious ideas have been developed to this end. Fans installed for ventilation are not always placed in the most accessible positions, so a leading manufacturer devised the trunnion fan which allows maintenance to be carried out without dismantling the trunkings, etc. By means of a handle operating a worm wheel and gearing, it is possible to rotate the fan and motor within the outer casing, thus obtaining easy access to either the motor or fan.

Another recent innovation concerns the aerofoil fans fitted in the Blue Funnel liner *Atreus*. These fans have two opposite handed impellers driven in opposite directions by two independent motors. With this type of fan it is possible to develop 2¾ times the pressure of a single-stage unit of equal size and speed without proportionate increase in sound level. It also provides a safeguard against complete shutdown as the failure of one motor merely reduces the air volume by about one-third.

Our readers' views . . .

D.C. Shunt Motors

IN his article dealing with d.c. shunt motors driving variable speed loads your contributor, Mr. R. Wells, stated that:—

> . . . it is neither economical nor practicable to use a constant supply with resistance control of the armature voltage where it is desired to obtain speeds below normal.

This method of speed control is much used in those cases where the motor has to operate against a constant or slightly falling torque, such as in certain printing press drives.

Provided the speed reduction does not exceed 25% this method proves quite satisfactory to the printing industry. It may not be economical in running cost, but it is certain economical in first cost and quite practicable.

A. N. D. Kerr
A.M.I.E.E.

ORPINGTON

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Use of Explosives

MIGHT I deal briefly with a few points raised concerning the recent article on blasting, I agree completely with Mr. Morrish's statement that '808' is more stable than gelignite, but during my travels around the country I have seldom been able to obtain it. Most of the dealers who stock explosives, only cater for the requirements of the local quarry or brickfield. Naturally the types vary, and one has to take whatever is available.

The majority are compounds of gelignite or ammonal, and conform to a Home Office standard. The word 'gelignite', therefore, must be accepted as a general term, and not a specific explosive. With reference to the short fuse, and running for cover business, this is quite unnecessary. I personally supervise all my own firing on a job until I am satisfied that the operator is fully competent (and, quite as important, is not likely to panic after igniting the fuse) before I permit any blasting during my absence. Never over a period of more than twenty years has any incident such as that described by Mr. Lomax, been my experience and although I have heard of such accidents they have been due to a certain amount of horse-play and fooling about more than any other cause.

With a view to simplicity, I avoided any reference to electrical detonation, because I have never found it necessary to carry out multi-firing for pole holes. When one is either hard rock mining or quarrying, where tons of spoil have to be shifted at a time, electrical firing is almost essential, but, as I said in the article small controlled charges are usually quite effective when taking down a pole hole, or tower stub excavation, and as it is seldom that more than two charges at any one time are required or even necessary, the safety fuse method described is both simple and reliable.

Should, however, multi-firing be necessary such as might occur in a long run of cable trench, then it is certainly no job for the amateur. Play safe and call in an expert!

The method described by Mr. G. R. Lomax of blasting under a pole to sink it into soft ground, was also mentioned by Mr. Weiss in his excellent book. There is no indication, however, of the size of the charge required, nor the formula for calculating it. I myself have not had the pleasure of meeting anyone who had actually done this operation and if there are any of your readers who have been more fortunate and either seen it done, or assisted in doing it, perhaps they would be good enough to pass the information on.

There are, however, one or two points in Mr. Lomax's letter that I cannot reconcile. For example, who rocks the pole and from where, while the charge is being fired (by electrical detonation, and presumably from a place of safety)? Also if the ground is of soft a nature to permit this to be done surely the tractor or crawler which is going to drop the pole from a winch will have some difficulty in getting to site?

R. Leonard

LYMINGTON

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Wagons or Tipplers

IN your issue of April 3, Mr. J. W. Harrison claimed that, if well maintained, tipplers are efficient and reliable. But as he admits that self discharging wagons would dispense with them, why continue to retain these huge, cranky, costly contraptions? They are enough to give anyone from abroad the nightmare.

He does not realise that all the wagons on the railways, excepting those built since the war, have long exceeded their proper lifetime of 20 years, on which all calculations—depreci-

ation, interest and wagon-hire charges—were based. They should now be swept off the lines as quickly as they can be replaced by one-quarter the number of 40, 50 or 60-ton wagons fitted with automatic couplings and vacuum brakes. Orders for them should be immediately distributed among all the railway workshops and the numerous private wagon-construction firms.

The present million archaic types of wagons contain over 50 per cent. more steel than is required to re-equip our railways with up-to-date wagon and coaching stock. The enormous expense (about £20 million a year) in continually repairing these outworn wagons would be almost totally eliminated, as the larger and stronger ones run for over 90 per cent. of their lifetime before needing repairs. Heavy savings would also be made in operating costs in order to reduce rates. By such means, American rates on coal are still less than 35 per cent. above 1914 levels, while British rates have been raised by some 350 per cent. Yet Mr. Harrison accuses me of Utopian dreams, rather than overcoming present difficulties.

Naturally he does not know that American trains now carry thousands of tons of coal in these larger wagons, which are unloaded at works, docks, etc., at the rate of one a minute. A ship is loaded and sails again in a couple of hours. What is the rate at Liverpool? A dock worker at Hull, writing to the *Daily Express* said that it took him and 16 other men from one Monday to the next to load a ship with coal! Have no improvements been made since the days of the Good Queen Bess?

Mr. Harrison should visit the United States, when he would probably soon be imagining himself another Rip van Winkle who, after sleeping for 50 years indulging in rosy dreams that everything in the garden was lovely, woke up, started rubbing his eyes in amazement at modern methods, thinking he had been transported into Utopia!

ST. NEOTS *E. R. B. Roberts*

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Solid Fuel Saving

BEING myself a victim of the growing shortage of smokeless fuels and listening to the grumbles of my fellow beings in the "Local", I thought you might be interested in a piece of electrical apparatus which it seems to me will go far in solving this problem.

It consists primarily of a method of supplying air to a boiler or furnace and, at the same time, thermostatically controlling the heat output. This piece of apparatus apparently allows almost any type of combustible materials to be burnt on the boiler and in the particular installation I saw some phenomenal results in the saving of fuel costs (in the region of 50 per cent.) are being obtained.

H. Mackinson

GREENFORD, MIDDLESEX

INSTRUMENTS FOR CONTROL

AUTOMATIC control methods applied to industrial processes are the subject of a paper read before the Institute of Fuel on Tuesday, when MR. E. C. KLEPP (Elliott Bros.) discussed some aspects of present practice and gave a forecast of future trends. In an historical survey with which he introduces his paper. this author relates the change-over from relatively simple on/off and proportional controls to computing methods to industry's change from batch to flow production methods. In such systems the amount of material being treated at any time was relatively small, so there was the possibility that changes of temperature on other controlled variables might be rapid. In such circumstances, controllers comprising integrative, proportional and first derivative action are required.

New Instruments

Such developments in control methods demand new instruments for the measurement of the variables concerned, and several of these are described in the paper. Amongst them is an oxygen analyser that depends on the paramagnetic properties of oxygen. A dumb-bell of quartz is suspended in a powerful magnetic field, and is controlled by a torsion head. The force on this dumb-bell, which can readily be measured, is a function of the magnetic properties of the gas surrounding it. Movements of the suspension cause a reflected light beam to swing across a photocell, the output from which feeds a meter calibrated directly in terms of free oxygen content.

A dew-point hygrometer also makes use of photo-electric cells. Some form of refrigeration is used to cool a small polished metal thimble, on to which the air under test is blown. When the temperature is low enough, a deposit of frost or moisture forms on the surface, and scatters a light beam which is directed upon it. This change is detected by a photo-cell, which is used to control a heater winding on the thimble. The system thus operates to maintain a temperature at which a steady deposit is just formed on the surface. A thermocouple embedded in the thimble then indicates the temperature, which is the dew-point of the air. The apparatus concerned is specially applicable where the dew-point is extremely low.

These instruments and others of a similar nature were described in Mr. Klepp's paper.

Assisting the Manufacturer

B.E.A.M.A. ENTERS ITS FIFTIETH YEAR

IT was just over fifty years ago that the forerunner of B.E.A.M.A.—the National Electrical Manufacturers Association, as it was then known—was launched. In those days there was difficulty in convincing the big plant manufacturers of the value of such an organisation, as Mr. R. W. Hughman recalled in his reminiscences in our issue of October 25, 1951. But with the change to its present title, and the advent of D. N. Dunlop as secretary, the British Electrical and Allied Manufacturers Association rapidly expanded, and today holds a pre-eminent position promoting the close co-operation of British concerns. The various milestones which B.E.A.M.A. has passed are briefly recorded in the 1951-52 report being presented at the annual meeting this week.

Record Exports

Special emphasis is given to the record quantity of electrical exports in 1951—the total was £189 millions; more than £30 millions or 20% higher than the previous year. A preliminary estimate of the exports of the principal electrical manufacturing industries of the world indicates a total of about £625 million at the present time—more than eight times the average value of electrical exports in the 1930's. The two major sources of such exports are, of course, the U.K. and the U.S.A., and together they were responsible last year for over 62% of the total value. But close watch is still being maintained on the activities of the German and Japanese manufacturers.

Home Sales Needed

The association assists its member firms to a considerable degree with statistics and information on a variety of matters, details of which will be found in the report, and continues to extend its direct participation in international conferences and gatherings. A second edition of the Beama Catalogue is also to be published next autumn. The industry has, of course, been urged to ensure that an even larger proportion of output goes to export, but where it seems likely that shortages of materials or import restrictions may hinder this effort, the Council endeavours to eradicate the trouble.

Attention is also drawn to the damage which can be done by excessive curtailment of home sales of electrical goods, as the result of propaganda, h.p. restrictions, and high purchase tax. The B.E.A.M.A. Council again emphasise that without a reasonable level of home production it will not be possible for the domestic electric appliance manufacturers to maintain, let alone extend, their hold on the export markets. In this connection a B.E.A.-B.E.A.M.A. joint committee has, in fact, been set up to collate data on electrical appliances in relation to fuel efficiency and economy, to combat certain recent statements. Papers on this matter are to be presented at the B.E.P.C.

Material Shortages

In the work of the Council committees, and of the sections, there will be found references to meetings to discuss shortages of materials, in particular electrical sheet, and from discussions with the B.I. and S.F. it has become clear that supply and demand are now much closer together than before.

The accessories industry, too, is hard hit by shortages of non-ferrous metals and moulding powders, and is earnestly searching for alternative materials. And in regard to the proposed National Inspection Council and National Inspection Board for Electrical Installation Contracting, B.E.A.M.A. has now become a sponsor of the scheme, it is stated, on the recommendation of the Accessories Section.

The principal work of the Dynamo and Motor Section during the year was concerned with standardisation and with industrial productivity; the first in connection with T.E. fan-cooled motors from 1 to 20 h.p., and the latter to suggest means of securing adequate steel supplies to enable motor production to be extended. The question of standard specifications for turbo alternators of 30MW, 60MW and 100MW capacity has also been discussed with the B.E.A. With the increased membership of the Insulations Sections, it was decided to divide this field into eleven subsections.

The various technical committees, too, have had a very active year, chiefly in connection with B.S.I. matters. For instance, standard voltage ranges for domestic electric cooker boiling plates were adopted, and the problem of applying these to cooker elements generally is being examined. Work is also in hand on the drafting of a standard specification for electric washing machines.

Problems and Practice IN ENGINEERING

Faulty D.C. Starter

ONE of the fuses of a d.c. motor fan motor circuit had blown. A lamp test indicated a fault to earth. A further test was applied with the motor leads disconnected, but the glow of the lamp still indicated a fault. A check-up was also made of the wiring but was found to be O.K. It was decided that the fault was somewhere inside the starter. The starter was of the totally enclosed type, the regulating lever being operated by a handle which projected through a slot in the cover. The cover was removed. A Megger test was applied to both the resistance box and the movable contact finger (fixed to the regulating lever). Surprisingly, the Megger test in each case showed practically infinity. However, after an inspection, a tiny blister was observed on the head of the fixing screw (holding the contact). It was evident that the cause of the fault had been due to the contact (in a certain position) pressing against the studs of the starter. It was also observed that one of the studs projected slightly beyond the remaining studs, thus causing that extra pressure. The stud was filed down, but as an extra precaution a piece of mica was wedged between the contact and head of the fixing screw.—*Novis.*

A Self-Reversing Motor

A SHUNT-WOUND 2 h.p. 220 V d.c. motor of very old vintage driving a small printing press was reported as having reversed its direction of rotation on several occasions. The motor pulley was 3 in. diameter, crowned; machine pulley 30 in. diameter, flat, of cast iron, driven by a 2 in. wide leather belt between very short centres.

Several visits were necessary before seeing the motor reverse. During one of these visits it was noticed that the machine operator altered the position of the motor brushgear. On questioning him it was disclosed that slightly different machine speeds were advantageous for certain classes of printing. Speed had been altered by this means for a number of years without any apparent trouble being experienced. While watching printing operations the driving belt came off and the motor was found running in the opposite direction to normal. The speed also appeared to be higher, with only a slight trace of sparking at the brushes. An inspection of the motor gave no reason for the reversal and the starter was examined, when a loose connection was found at the n.v.r. coil terminal post. The starter contacts were also dirty, causing sluggish return of the starter arm. On making good these defects the motor operated perfectly and has done so now for a considerable period of time. It would appear that the loose connection caused an intermittent open circuit in the motor shunt field, with consequent heavy increase in armature current, and therefore armature magnetic flux. As the brushgear setting was considerably off "neutral" (in this case "backwards"), the strong armature reaction reversed the residual magnetism of the motor field and thereby reversed the direction of rotation of the armature. On account of the inertia of the driven machine, etc., the driving belt came off immediately the reversal took place. The starter was mounted on a wall subject to a good deal of vibration, but only at times when another very heavy reciprocating press was running.—*E. A. Robbins.*

Troubles with Brass

ONE wonders if enough care is sometimes given to the selection of metal for some components. Two failures of metal straps which cracked on comparatively new work bring this to mind. In one case a push-button starter controlling a refrigerator broke down. After checking the pressure switch, mains were run direct to the motor, which started immediately. On opening the starter, the trouble was found to be a cracked brass strap. The same failure occurred with a bell, and in this case there was no question of corrosion. In yet another instance two rotary switches failed due to the metal being unsatisfactory. The contractors received new switches and a report from the responsible sales manager regretting "such disappointing performance."

Possibly in these cases the original metal had crystallised, due to cold rolling or stamping. However, this may be most annoying where jobs are under guarantee, and repairs have to be done in our own time.—*H. M.*

Contributions to this page dealing with specific items of interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates. Problems of a practical nature to which a solution is required will also be considered. Contributions should be written on one side of the paper only and may be accompanied by sketches, which will be re-drawn for publication.

Prospect for Electrics

Technical features and operating characteristics of battery powered road vehicles discussed by I.E.E.

PROSPECTS for the battery electric vehicle in this country were considered at an I.E.E. Utilisation Section meeting held last Thursday, when MR. H. H. HEYMAN, B.SC., A.M.I.E.E. (Smith's Electric Vehicles), presented an integrating paper on the subject. He suggested that British living habits had much to do with the success of this type of vehicle here, as compared with other parts of the world. A preference for small houses rather than blocks and tenements introduced town planning conditions very favourable to the use of electric vehicles.

The cost of the chassis of an electric vehicle, without battery and charger, has remained consistently slightly higher than that for an equivalent petrol-engined unit. There have been improvements, however, in the comparative costs of fuels. In considering fuel for such comparisons, the battery has to be considered as consumable, with a life based on guarantee. On calculations as at December 1951, the total cost in pence/ton-mile of pay load is 3·54 for petrol and 3·28 for a battery vehicle.

Evaluation of the performance of a battery electric vehicle presents some difficulties, since battery life and the way in which operation affects it has to be taken into account. In the paper there is a suggestion that two performance factors should be obtained, one with continuous running and the other with frequent stops, both being in terms of average speed × mileage × payload ÷ battery kWh. The difference between these two factors represents, by its smallness, the suitability of a vehicle for the duty it is called upon to perform.

Future Prospects

Finally, in his paper, Mr. Heyman estimates what may be the future prospects of battery-electric vehicles. Milk delivery, mobile shops, bakers' and coal deliveries, and use by the railway and postal authorities are all considered suitable jobs for such vehicles, and even if relatively new fields are omitted, it is suggested that an expansion in the region of 13,000 vehicles may be hoped for, with an ultimate annual home market of 1,500 to 2,000 new battery vehicles, including replacements.

More technical aspects of design were dealt with in a companion paper which MR. W. D. SHEERS, M.I.E.E. (Metropolitan-Vickers), presented under the title "Electrical Equipment of Battery Road Vehicles." Dealing first with batteries, Mr. Sheers notes that the greater cost and higher internal resistance of alkaline batteries as compared with lead-acid has restricted their use in road vehicles. This duty may involve heavy discharge rates especially in hilly districts, but although this has an effect on the capacity of the battery for that charge, the only really harmful conditions for lead-acid cells are overcharging for long periods, and prolonged discharging at low currents.

Transmission Systems

General design considerations require a high ratio of motor speed to road speed, though this tends to make the speed uphill somewhat slow. In general, delivery vehicles with a range of 30-40 miles should climb a 1-in-10 gradient at 6 m.p.h., and vehicles of other classes at 3-4 m.p.h. The author suggests that the best type of drive from motor to wheel is by means of a rubber-cushioned propeller shaft and a back axle of standard petrol-driven-vehicle type. The higher ratio of propeller-shaft speed to wheel speed should be obtained by means of an additional pair of spur gears. Worm reduction gearing has a materially lower efficiency. The use of two motors, omitting a differential, involves greater losses and a higher initial cost for most vehicles.

Motors are usually series wound, except for pedestrian-controlled vehicles, which may employ compounding to prevent the truck going too fast, and are usually four-pole machines. Brush gear must be most robust. Electro-graphitic brushes have been found useful for voltages above 60, while a carbon with some copper included has advantages on motors of about 30 V. Ball and roller bearings are always used, with special attention to the risk of severe end shocks due to relative movement of motor and chassis.

In practice, Class B insulation is usual, and field cores have no soldered joints. The actual limit to the operating temperature of the motor is the melting point of the solder in the commutator connections.

Pedal-operated gear is now universal, sometimes with an associated press-button to

produce the change from series to parallel connection. Controllers should be as simple as possible, but it is essential that they have some form of time delay, and in the case of long-range (30-40 mile) vehicles with frequent stops and starts, some form of series-parallel battery control is necessary. This may incorporate a spring and dashpot operated by the control pedal. With 30 stops/mile an increase in range of 19% has been obtained by increasing the time to reach the last notch of the controller from 1·5 sec to 5 sec, while series-parallel control on this duty produced a 32% increase in range.

In general, the controller is likely to be of the drum type, with a cam-operated line-contactor. This type of controller does, however, require maintenance involving one or two man-hours/month, with a change of segments and contacts every year or so. It seems fairly certain that it will eventually be superseded by a contactor type of controller. In this the necessary connections for series-parallel operation may be set up by three contactors, which are mechanically interlocked. Overload protection is sometimes provided in the form of a heavy fuse, but this may be omitted because of the danger of the vehicle running backwards if the fuse should blow while a steep gradient is being climbed.

The author considers that regenerative braking, which is often suggested, is not worth while, since the increased cost of controller and motor would substantially exceed the saving on the battery. It is possible that rheostatic braking may be considered in very hilly districts as an additional safety measure. Building the motors into the driving wheels, in order to obtain a low floor to facilitate loading, is likewise usually too expensive in first cost.

DISCUSSION

MR. R. BIRT (L.E.B.) said that he had hoped that regenerative control could be applied to battery electric vehicles, particularly because of the savings it might effect in replacement batteries. For refuse collection, he suggested that the electric tractor would be more economical than a heavy electric van.

MR. C. P. LOCKTON (Chloride Batteries) confirmed that the use of end cells of a battery to power auxiliaries such as lights was possible. He expressed surprise at Mr. Sheer's recommendation of a battery relay as a safeguard against failure of the combined voltage-relay and time switch. He considered these very reliable. A British Standard for batteries for electric vehicles would be of great help to the battery manufacturer.

MR. W. GILBERT (Ransomes Sims) thought that more attention should be given to the development of contactors for heavy currents at low voltages. He considered arc shields unnecessary for this duty. He asked if the authors had any views on a recommended placing of control pedals and steering column.

MR. C. F. ATKINSON (Nife Batteries) said that there were some 3,000 alkaline batteries in use on industrial trucks, mainly of the flat-plate nickel cadmium design. Underground battery vehicles also made wide use of alkaline cells, especially the tubular positive nickel iron battery. The previous lack of a manufacturer in the country was probably part of the reason for their neglect for road vehicle applications. It was important that designers should appreciate that lead-acid and alkaline batteries were fundamentally different, and that different designs were needed to make the best use of the characteristics of each type.

Mr. E. W. BROWNING (London Co-op. Soc.) mentioned that unless drivers were carefully warned, there was a serious danger of burnt motors due to speeding down hills. He saw a tendency in recent years for the pedestrian-controlled vehicle to eliminate the battery van, and roundsmen's preferences seemed in this direction. There was also a move towards cutting down deliveries, self-service shops being a step in this direction.

MR. S. L. COOKE (N.C.B.) reviewed investigations made by the N.C.B. into the relative costs of operating battery and diesel locomotives underground. For intermittent work, there was little difference in costs provided there was an equal amount of work each day. The big difference in costs came in the cost of battery attendance underground, which ran as high as 3d./pay load ton mile.

MR. A. N. D. KERR (E.P.E.) questioned Mr. Sheer's statement that Class B insulation was used throughout motors for battery electric vehicles. He mentioned that one manufacturer alone built 874 motors for this duty with class A insulation. He stressed the safety of the electric vehicle from the point of all road users.

MR. J. H. GOSDEN (B.E.A.) spoke of the attitude of the supply industry to battery road vehicles. The value of the load was recognised, but experience showed that it was useless to try to use such vehicles on duties for which they were not suited. The B.E.A. was carrying out long-term research into more suitable batteries for traction use, and encouraging such work in one university. Area Boards gave electric vehicles a 10-year depreciation life.

Mr. W. BAMFORD (Everett Edgcumbe) described an instrument which indicated the pay-load capacity of the battery at any instant. It worked by integrating the two components of the battery voltage when on load.

MR. G. C. ALLINGHAM said that alkaline batteries had many important advantages for road vehicle applications. During the past 15 years many vehicles had used nickel-iron batteries, and the owners would like to go on using them if only the batteries were more readily obtainable in this country.

The authors replied briefly to these and other speakers who took part in the discussion.

E.D.A. in 1951

The Accent was on Aids to Productivity

PRODUCTIVITY and the way in which electricity can help improve it has engaged the particular attention of the Council of the British Electrical Development Association. This is the outstanding feature in the 32nd annual report of the Association, covering the calendar year 1951, which was adopted at an Annual General Meeting last Friday. The Council of E.D.A. expresses itself as confident that the area boards can contribute to increasing production through greater electrification, and that they can do this in many diverse ways.

To back up this work, the Association has in hand the production of study books to assist in the training of industrial power engineers and provide a ready source of reference in the field. In addition, a film dealing with materials handling is being prepared. Three study books and film strips are in preparation, covering materials handling, industrial lighting and industrial heating. Members of the Association are also trying to have papers read to various professional and trade bodies, on the theme, electricity and productivity.

During the year, attempts were made to have the burden of purchase tax on electrical appliances eased. This was continued at the October General Election, after which a memorandum was sent to all M.P.s setting out the Association's case for the abolition or reduction of purchase tax on domestic electrical appliances.

Educational activity during the year, included the publication of 14 new booklets and four films. Work was continued on 10 further books and four films—entitled electrical measuring instruments, alternating currents, induction, and capacity. Copies of films issued on loan during the year reached a total number of 11,588.

Testing House

During the year the E.D.A.-B.S.I. testing house issued 50 reports and 12 addenda to previous reports. 25 reports were prepared for the advisory committee on electrical appliances, and 14 reports for the Canadian Standards approval division of the B.S.I. in connection with the Canadian export scheme.

The new building for the testing house, which is being erected at Leatherhead, will, it is hoped, be ready for occupation shortly. An interesting feature of the building is its electrical floor-heating installation, which is designed to provide information regarding such factors as surface loading and depth of heating coils. Special equipment, designed and made in the testing house, will measure the heat transmitted through the floor.

Exhibitions

Details are also given in the report of the Association's participation in many exhibitions during 1951, including, of course, the Festival of Britain. There is also information on the work of many specialist committees.

Electrical exhibits for agricultural shows are now the responsibility of a sub-committee of the Rural Electrification Committee. The technical and general sub-committee of this committee prepared, during the year, a number of publications, including two farm electrification handbooks. It also administered a scheme whereby models were made available for loan by members. Technical work included consideration of the use of bright emitter infra-red lamps for poultry keeping.

Amongst the work of the Domestic Installations and Appliances Committee was consideration of whether the manufacture of mains plugs embodying capacitors for radio interference suppression should be recognised by B.S.I., not withstanding the associated shock hazard. The cooker sub-committee investigated a number of technical points, while the water heating sub-committee was concerned with a number of matters, including electricity in laundries.

Allied Associations

Addenda to the report give notes on the work of the Electric Vehicle Association of Great Britain and the Electrical Association for Women. The former association was invoived during the year in a vigorous campaign to secure a reduction of purchase tax on battery electric vehicles. Attempts were also made to secure a better appreciation by Government and other bodies, of the valuable contribution that electric vehicles can make to the national economy because they do not use imported fuel.

E.A.W. activities during the year were much concerned with the Festival of Britain, though normal branch meetings continued and a very full programme was covered.

Cable Capacity of Conduit Ducts and Trunking

A GRAPHICAL METHOD OF CALCULATION

By R. CROFT, B.Sc. (Hons.), Graduate I.E.E.

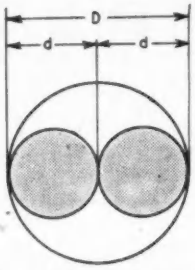


Fig. 1 above, illustrates cable capacity of conduit

THE problem of deciding what size of conduit, ducting or trunking is required for a number of wiring cables of varying sizes occurs very often in practice and owing to the fact that there is no official data, the problem is a constant source of inconvenience to all engaged on installation work.

An unlimited number of tables would have to be compiled for all the possible combinations of 250 V grade v.r.i. cables in all the sizes of h.g. steel conduit alone; but the problem can be solved quite quickly and reliably by a simple graphical method.

These graphs are based on a ratio which might be called the efficiency (η) of the conduit run and is defined as the ratio of the sum of the overall cross-sectional areas of the cables installed (A_c) to the actual internal cross-sectional area of the conduit (A). Another useful term is the effective area of the conduit (A_e) which is the product of the efficiency and the actual area, i.e. $A_e = \eta A$.

The American "National Electrical Code" gives an average figure of 40% for this efficiency.

It is interesting to consider what the maximum value of the efficiency is for various numbers of cables. Referring to Fig. 1, for the case of two cables of equal size,

$$A_c = 2\left(\frac{\pi d^2}{4}\right),\ A = \pi d^2,\ \therefore\ \eta_{2\ max} = 0{\cdot}5 \text{ or } 50\%$$

It can be shown that for a large number of cables, $\eta_{\infty\ max} = 75\%$. Table 1 shows the values of η_{max} for some of the combinations of cables of the same size.

TABLE 1. THEORETICAL EFFICIENCY OF CONDUIT FOR VARIOUS NUMBERS OF CABLES

No. of cables	η max	No. of cables	η max
2	50·0	9	69·1
3	64·6	10	62·8
4	68·7	19	76·0
5	68·6	37	75·5
6	66·7	61	75·3
7	77·8	91	75·2
8	73·2	127	75·1
		∞	75·0

Table 1 makes no allowance for (1) clearance for ease of drawing-in, (2) tolerance in conduit size, (3) tolerance in cable size, and (4) different sizes of cables. Some allowance has to be made for these in practice and an examination of Table 22 in the I.E.E. Regulations will reveal that the maximum practical efficiency tends to a limit of 45%, with one or two exceptions. Table 23 seems to indicate a higher value.

Using this figure a series of straight line graphs of number of cables against overall cable area can be plotted for each size of cable and the area scale can be calibrated with various conduit sizes, taking 45% efficiency.

The graph is drawn for 250 V grade v.r.i. taped and braided cables and is calibrated for several types of conduit and ducting.

Example

The use of the graphs is best illustrated by a simple example.

Example 1: To find the minimum size of conduit for installing the following cables:—four 7/0·044, three 7/0·064 and four 19/0·044.

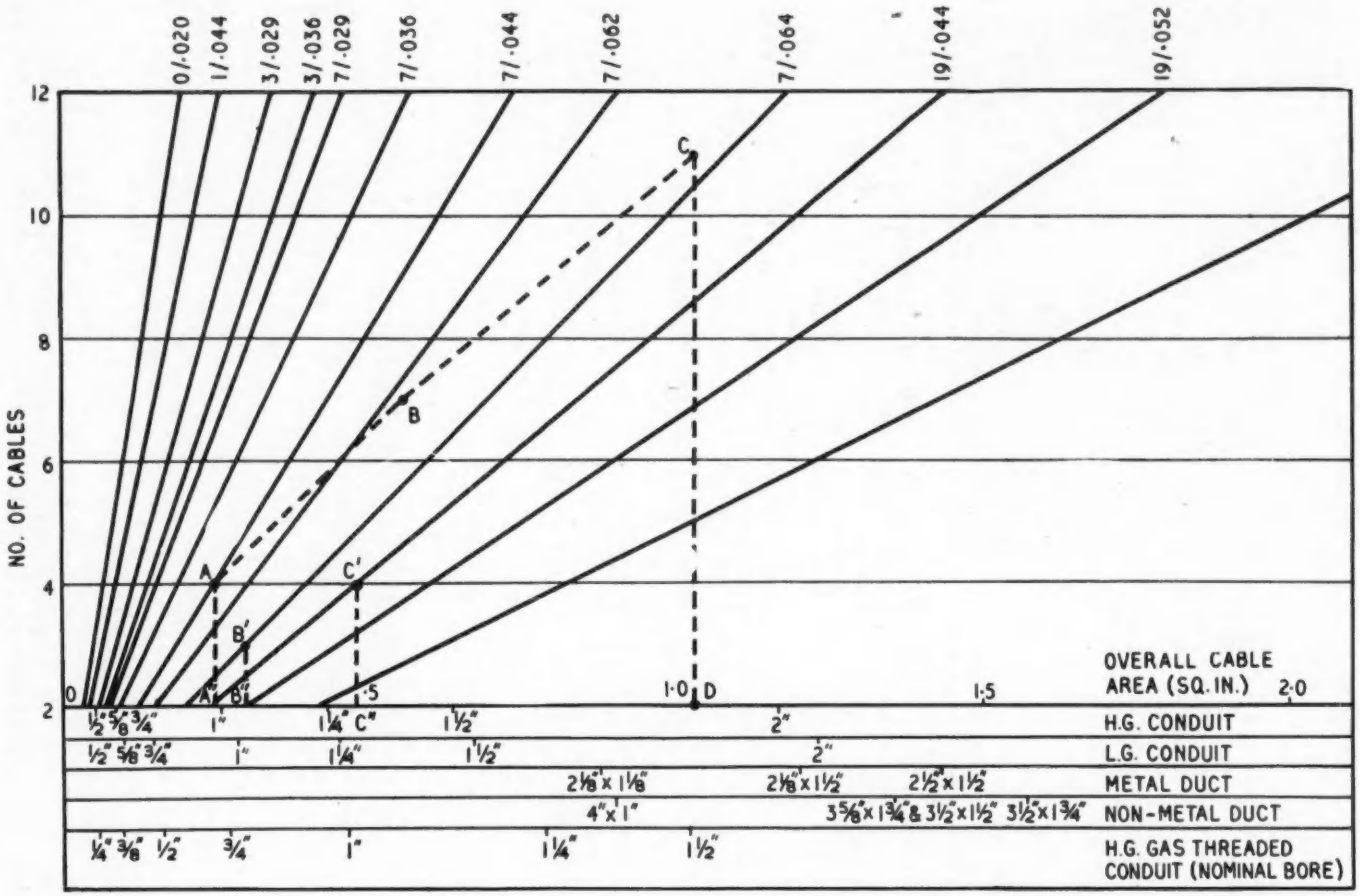
Proceeding from point A at the intersection of the four-cable ordinate and the 7/0·044 characteristic, draw a line parallel to the 7/0·064 characteristic to point B at the intersection of this line with the seven-cable ordinate. Similarly, draw BC parallel to the 19/0·044 characteristic, the point C being on the 11-cable ordinate. Now project down to point D on the abscissa and it will be seen that a 1½ in. conduit is not large enough, but the cables will fit comfortably in a 2 in. conduit.

Another way to arrive at the same result is to project down to the abscissa from A to A″, and repeat for the other two cable sizes and add the sums of the cable areas.

e.g. OA″ + OB″ + OC″
= 0·25 + 0·30 + 0·48
= 1·03

Referring to the graph 1·03 = OD, again indicating 2 in. conduit.

759



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Using an efficiency of 45%, similar curves can be drawn for (1) 660 V v.r.i. cables in conduit, etc. (2) 250 V p.v.c.i. cables in conduit, (3) P.V.C. telephone cables in conduit.

When the number of cables in the conduit or ducting exceeds a dozen or so, in view of the increasing difficulty of drawing-in the comparatively large number of cables simultaneously, it is advisable to adopt a more conservative efficiency of 40%, and a set of curves for this efficiency used. 40% is also suitable for 250 V l.a.s. v.r.i. cables in gas barrel. In constructing graphs for trunking, owing to the fact that the cables do not have to be drawn-in, the higher efficiency of 55% can be taken.

On the other hand when considering the case of t.r.s. cables drawn into ducts cast in cement screed, in view of the increased friction met with on drawing-in, and of the shape in the case of twin cables, it seems more reasonable to base the graphs on an efficiency of 40% until sufficient practical experience is obtained.

Finally, if use is made of some form of simple relationship between maximum distance for draw-in boxes and efficiency similar to that given in Table 2, suitable distances for draw-in boxes can be determined. First the actual efficiency (η_a) must be found by multiplying the efficiency on which the graphs are based (η), by the ratio of the area actually occupied by the cables (A_c) to the effective area of the conduit (A_e), i.e.

$$\eta_a = \frac{A_c \eta}{A_e}$$

Then the maximum draw-in distance can be obtained from Table 2, or from a graph.

Example 2: To find the maximum distance between draw-in boxes on a straight run of 2 in. conduit with the same conductors installed as in Example 1.

From Fig. 2. $\eta_a = \frac{1{\cdot}03}{1{\cdot}16} \times 45 = 40\%$

$\therefore$ Maximum distance = 60 ft.

TABLE 2. MAXIMUM DRAW-IN DISTANCES

Actual efficiency % (η_a)	25	33	40	45	50
	Max. distance between boxes in ft.				
Conduit, straight ...	200	100	60	40	20
Conduit, 2-90° bends ...	100	50	30	20	—
Conduit, 3-90° bends ...	50	25	15	—	—
Ducting, non-metallic ...	125	63	38	25	—
Ducts, cast in situ ...	100	50	30	—	—

Coal Dust Gives Crystal Metal

GERMANIUM is one of the chemically "rare" methods which recent advances in electrical techniques have brought into prominence. Its possibilities as a rectifier when used in crystal form have been mentioned several times in these pages, but the problem has always existed of securing sufficient supplies. So long as small amounts only were required there was little difficulty, but these developments quite altered the position.

An interesting story of the search that ensued is told by Messrs. R. C. Chirnside and H. J. Cluley in the current issue of the "G.E.C. Journal." Before the war it had been found that germanium was present in small amounts in many British coals. Further to this, it had been shown that when coal was distilled in gas works, the flue dust contained a concentration of germanium in its dioxide form that was sometimes as great as 1% of the total weight.

Quite apart from the work involved in finding worthwhile sources of germanious flue dusts, a lengthy development in the chemical and metallurgical problem of extracting the dust had to be completed before practical use could be made of this British source of the metal. This task was complicated by the exceptional purity required for electronic crystal application of the metal. Arsenic occurred with the germanium in the dust, but in the crystal form it had to be present in concentrations of less than one p.p.m. of germanium.

Co-operation between the G.E.C. laboratories and Johnson, Matthey and Co. finally led to a satisfactory technique that is now producing germanium on a hundredweight scale. A smelting process under reducing conditions is used to give an iron copper alloy containing about 4% of germanium and 2% of gallium. This represents almost complete recovery of these two rare elements.

Subsequent distillation of this alloy after solution by a chlorine treatment yields liquid germanium trichloride, the gallium remaining in the still. The problem is then to purify this compound from which the metal can be eventually obtained. Fractional distillation yields a product containing only a few parts per million of arsenic as an impurity, but this is not good enough for electronic use. By packing the distillation column with pure copper turnings, however, the arsenic content was reduced to 1 to 2 p.p.m., and when the technique was modified, down to 0·5 p.p.m., which is satisfactory for electrical purposes.

Heating a Church

Electric Installation at Tilsworth has proved a Success

OF all the edifices used by the public the thirteenth-century church with its thick stone walls and vast interior space is probably the most difficult to heat. When in addition the questions of the appearance of the installation and the economic situation of most parish churches must be taken into account, the heating engineer must solve a difficult problem.

One church, where a satisfactory solution has been reached, is All Saints Church at Tilsworth near Leighton Buzzard. Here a temperature of 55-60° F was needed for the congregation in the main nave of the church, and localised heat for the choir stalls.

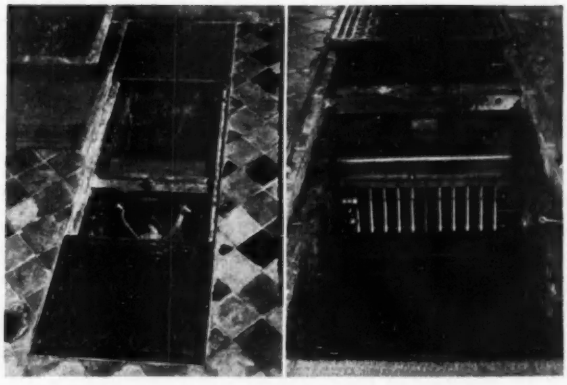
The actual work was carried out by the Eastern Electricity Board from a scheme prepared by the General Electric Co. Three G.E.C. 10 kW unit heaters, fitted with low-speed fans having self-aligning and self-oiling bearings, and 128 ft of single-way tubular heaters were used. The total loading of this installation was 37/68 kW.

As can be seen from the photographs, the unit heaters were placed below gratings in ducts lined with Bitulac bonded fibre glass, supplied in semi-rigid slabs measuring 2 ft by 3 ft by 2 ins. and covered with 1-in. mesh galvanised wire-netting as an insulator against the cold concrete in the initial stages and as a sound deadener to suppress the slight hum of the fans.

Two of the heaters are located at the east and west ends of the main aisle, the third being near the south door. The arrangement is such that the air streams circulate in an easterly direction and by this means the forward unit helps to raise the temperature in the chancel and at the altar.

The tubular heaters, fifteen in number, are employed in various positions. Some are fixed horizontally by wall-fixing brackets to check the cold down-draught from the windows, and others placed under the choir stalls at either side of the chancel.

During the past winter the performance has proved wholly satisfactory. Consumption has, in fact, averaged some 60 units for each service.



The duct installation arrangement is shown above

B.T.H. RESEARCH IN 1951

Investigations Carried Out in All Electrical Fields

A GREAT variety of subjects was investigated by the B.T.H. Research Laboratories in 1951. On the materials side investigations were continued into the effects of crystal orientation in magnetic sheet steels, into high-temperature materials for gas turbine work and into special glasses. In this latter field, tellurite glasses are of interest due to their remarkably high refractive indices—up to 2·25 at 5,780 Au. These also have unusual infra-red transmission properties and high dielectric constants.

The Physical Analysis Group has expanded considerably. Spectrographic analysis has been used to identify and estimate small traces of impurities in various materials notably in, calcium sulphite and halophosphate phosphors. Another subject in which spectrographic analysis has proved useful, is in the estimation of the argon "clean up" in sodium vapour lamps as used for street lighting.

Insulating Materials

A number of polyester resins has been prepared. These are liquids which can be completely converted by heat or by the addition of accelerators into infusible solids. They can thus serve as solventless varnishes or as casting resins for insulation purposes, and have been used for contactor coils, small dry type transformers, magneto coils and motor stator units. Special techniques have had to be worked out to suit particular applications.

Research on phenolic resins has resulted in the preparation of a new laminating resin which will shortly go into production. Its use makes possible the manufacture of resin bonded paper tubes of outstanding resistance to water.

A core plate enamel has been developed for the laminations of hydrogen-cooled generators. Beside good chemical resistance, the enamel can stand up well to high temperatures. Tests on a stack of thirty-five silicon steel plates coated with the enamel and subjected to a pressure of 200 lb/sq in. at 280° C have been carried out. The resistance between the end plates remained above 8,000 ohms after 55 hours at this temperature. A further insulation phenomenon under investigation is the exfoliation of mica by ultrasonic vibration. The splittings are reduced to flakes about a square millimetre in area and 10^{-5} centimetres thick. In water this exfoliated mica can be formed into a sheet material without requiring any binder. It is thought that the flakes are either perfectly flat or have sufficiently perfect flat areas to allow very close contact between units to occur with a consequent self-bonding action.

Instruments and Apparatus

Infra-red temperature measuring equipment and photo-electric relays using the lead sulphide photocell have shown considerable progress, and work has continued on the semi-conductors resulting in a new "p-n function" type germanium rectifier. In the nuclear physics field, a technique has been developed for producing glass betatron toroids which have a cross sectional shape which takes maximum advantage of the magnetic flux available. A great advantage of this technique is that there is no thinning of the walls at the "corners."

The extraction of ferrous particles from the eye has long presented a difficult electromagnetic problem. Designed to a surgeon's specification is a new ophthalmic magnet. It was necessary that the weight should be less than 15 lb, as it had to be hand held, and the power consumption should be under 2 kW so that a domestic power point could be used to supply the magnet and rectifier. Despite these limits and other necessary restrictions the magnet optimises the force on a small iron particle 25 mm from the pole tip so successfully that the performance of this hand magnet is superior to any giant magnet known of similar type irrespective of its size and power.

Erection of the 2 MV impulse generator in the heavy plant factor in Rugby works is now finished and the equipment is in operation.

Lighting

The phenomenon of electroluminescence—or the direct production of light by the application of an electric current—has been further investigated. Following the high-pressure xenon development, several practical lamps are emerging. A "low" working voltage flash tube has been developed to operate on 800-1,000 V with a maximum flash rating of 100 joules.

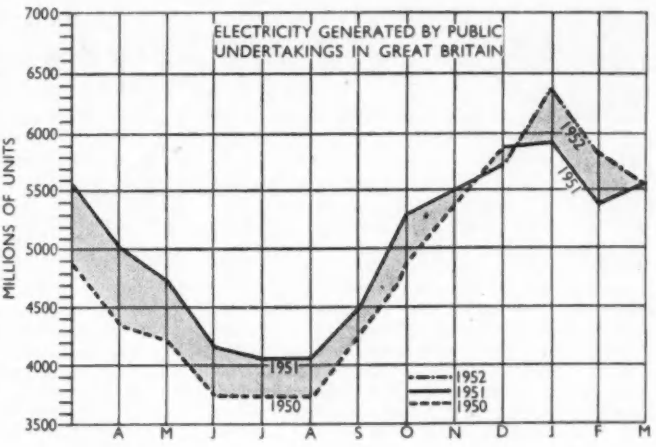
In the fluorescent lighting field small 6-watt lamps have been produced for local lighting requirements. At the other end of the scale are 200-watt mains voltage lamps, with instant start facilities.

UNITS GENERATED

5,549 million units was the total generated during March in stations under the control of the B.E.A., the North of Scotland H.E. Board, and the Lochaber Power Co. The corresponding figure last year was 5,550 million units, so there has been no appreciable change over the twelve months.

Of the total, 5,361 million units was generated in steam stations and 174 million units in hydro-electric.

Energy sent out during the month was 5,236 million units, 94·4% of that generated. This gives the total for the year so far as 16,708 million units, showing an increase of 4·9% on the first three months of last year.



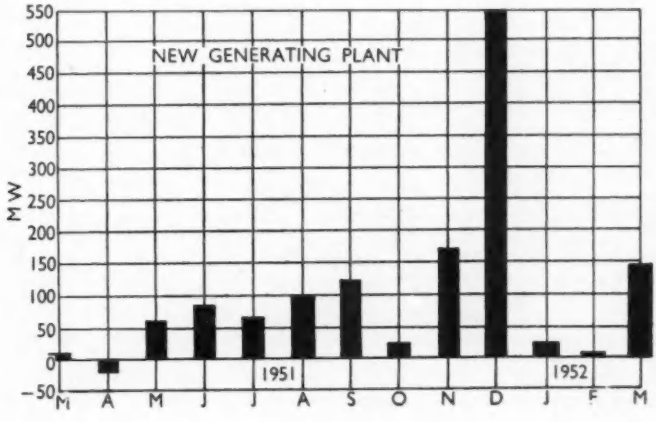
POWER SUPPLY IN MARCH

LONDON division, with 82·5 MW of new generators and 1,365 klb/hr of extra steam raising capacity coming on load takes pride of place in the March installation list issued last week by the B.E.A. Brunswick Wharf came on load for the first time, with a 52·5 MW Metropolitan-Vickers set and two 320 klb/hr Clarke Chapman boilers. Steam conditions at this station are 900 lb/sq in, 900° F at t.s.v, and present plans provide for three more 52·5 MW sets, two at 60 MW, and nine more boilers.

At West Ham B the third 30 MW English Electric set was brought into operation, and with it a fifth of 180 klb/hr John Thompson boiler. Steam conditions here are 600 lb/sq in, 850° F, as they are at Blackwall Point, where a 365 klb/hr boiler was completed.

In the Southern division, planned extensions to the Portsmouth station were completed with the installation of a 30 MW B.T.H. set and two 180 klb/hr Mitchell* boilers. These additions bring the installed capacity of the station up to 140 MW, the largest in the division.

Rye House, at Hertford in the Eastern division, which was newly commissioned in December, has had a second 30 MW Richardson-Westgarth-Parsons set completed, and with it another 350 klb/hr Babcock and Wilcox boiler. Further north, at Warrington (M. and N.W. division), extensions have been continued with a 200 klb/hr Simon Carves boiler, while at Westwood, Wigan (N.W. Div.), a third 300 klb/hr Babcock & Wilson boiler was added.



GENERATING PLANT

At the end of March, 1952, the installed capacity of the B.E.A. was 15,855 MW, showing an increase of 144 MW during the month. During this same period the North of Scotland total remained stationary at 644 MW. The month's commissioning figures bring the overall increase during the past twelve months to 1,331 MW, or 8·8% of the March, 1951, total.

The total installed capacity used for the purposes of this graph should be distinguished from the output capacity. The installed capacity is the total m.c.r. of all the generating sets which are connected on both steam (if appropriate) and electric sides and are suitable for service.

overseas news

Tariffs up 20%

The news that electricity charges are to be increased by an average of 20% by the State Electricity Commission of Victoria, has brought forth local protests. But the Minister for Electrical Undertakings, Mr. Dodgshun, has stressed that the State Electricity finances are in such an alarming position that the steep increase in charges was inevitable, adding that it is only the first of a number of rises that will be necessary. He has rejected a request that the Government should appoint a Royal Commission into the administration of the Commission. Mr. Hunt, chairman of the Commission, has said that the S.E.C. has to find £3,000,000 additional revenue to meet its commitments in the next financial year.

Franchise Extension?

The question of whether the franchise of the City Electric Light Co., Ltd., of Brisbane, which will expire on February 1, 1954, should be extended or not was recently discussed in the State Parliament. The Government can exercise its option of purchase over the company's generating and distribution assets, or hold an annual right of purchase after the franchise expires. According to reports, it seems that there are some members who favour an extension of the franchise, but the Premier, Mr. Gair, would give no indication of the Government's intention. He said no decision had been made, but agreed that the company was entitled to an early indication as to its future. At the annual meeting of the company recently, Mr. J. H. Holmes, chairman, said the Government had been asked to extend the franchise for a further 15 years.

Connection Delay

Unless the State Electricity Commission of Victoria can hasten its new installation schedule, some homes in the State may not get electricity for at least 16 years, according to Mr. K. Sutherland, general manager of the Commission's Electric Supply Department. There were 70,000 homes outside the metropolitan area awaiting connection, but the quota of 7,000 extensions a year had been cut to 4,500 by the reduced loan programme, he pointed out a few days ago. Mr. Sutherland was addressing a deputation from the Australian Primary Producers' Union, which saw Mr. Dodgshun, Minister for Electrical Undertakings. The A.P.P.U. protested against land owners in the Emu Creek-Eppalock area having to lend £800 interest free to the Commission for power connection. Mr. Dodgshun said Victoria hoped to get a bigger loan allocation next year.

Review of Operations

By 1956 the Hydro Electric Power Commission of Ontario will have a reserve of power of less than 10% over known requirements, Minister Challies told the Legislature a few days ago when reviewing the 1951 operations of the Commission. Simple prudence demanded a minimum reserve of 10%, he said. Under present circumstances it would seem reasonable to maintain a 15% reserve. The answer to the pressing need, indeed, the only answer within economic acceptability, was development of the St. Lawrence, Mr. Challies stressed. The total of 18,800 million kWh last year was more than four times the total generated and purchased in 1931. A further 25,795 rural consumers were connected, bringing that total to 318,606, while the farms connected amounted to 73% of the total recorded in the 1941 census. During 1951, expenditure of the Commission amounted to over $645 millions, including $157 millions on goods and services, of which $131 millions were bought in Ontario.

Development

Improvements to the Moosomin power distribution system costing a total of over $21,000 will be made early this summer by the Saskatchewan Power Corporation, according to a recent announcement by J. R. Sarsfield, the Business Manager of the Corporation. It is expected that the work will begin this spring.

Farmers Should Use Power

That the criticism that many farmers are not making full use of electric power in farm work is applicable to many countries, is evident from remarks of Mr. M. E. Dodds, of an agricultural experimental station in Saskatoon, recently. He told of a survey made on a small sample of 87 farms on which electricity was used. On these it was found that more electrical appliances were being used in the home than for the operation of the farm. These farmers had invested $65,000 for domestic appliances and only $18,500 in productive machinery operated by electricity.

Methane Station

A new power station has started operation at Tavazzano in Northern Italy. So far only one generator unit, with a capacity of 62,500 kW, is in operation. The new station, which is to have a total capacity of 125,000 kW, is the first to be built in Italy specially for utilising methane produced in the Padua Valley. It was planned and constructed by the Montecatini Company in less than two years.

380 kV Line Working

Having temporarily operated at a voltage of 220 kV for some months, the 380 kV transmission line from the Harspranget power station in the Arctic Circle to the southern part of Sweden is now operating at its nominal voltage, we learn. The line is about 600 miles in length, and is supported by twin steel towers. The Harspranget power station, on the River Stora Lulealv, some 36 miles inside the Arctic Circle, has three vertical Francis 96 MW turbo-alternators installed, with provision for a fourth similar set.

Large H.E. Schemes

The Rihand dam, largest of its kind in the East, will, according to the new time schedule of the Uttar Pradesh State Government, be completed by 1960-61. The project, designed to pave the way for the agricultural and industrial development of the eastern parts of Uttar Pradesh, comprises the construction of a 300-ft-high dam and power station with an installed capacity of 240,000 kW on the Rihand river in Mirzapur district. The Rihand reservoir, with an area of 180 square miles and a capacity of 8.6 million acre feet, will be the largest reservoir in the East. The project will cost Rs. 327 million, of which Rs. 188 m. will be for the dam and power plant, and Rs. 139 m. for the transmission and distribution system.

Another Plant Operating

Pakistan's largest hydro-electric station, at Rasul has been officially put into operation. Completed at a cost of Rs. 8½ crores, the station has two 11,000 kW sets installed.

Lamp Position

Asserting that the present ban on the import of electric incandescent lamps adversely affects dealers and consumers, the Pakistan Electrical Merchants Association is making representations to the Government of Pakistan to permit limited imports. The Association feels that the local factory has not only enhanced prices but gives poor deliveries, and is incapable of meeting the full needs of the market.

Coastal Electrification

The £400,000 electrification scheme of the Electricity Supply Commission of South Africa extending supplies to the Natal South Coast, is expected to be completed in September. By that time, it is expected that the 88kV line from the Commission's Congella power station, will be in operation. This scheme is expected to result in the further development of holiday resorts, the expansion of existing industries and the establishment of new factories along the coastal belt.

Coal Priorities

The South African Minister of Transport has now set up a Coal Allocations Committee, whose task it will be to see that coal is delivered as fairly as possible to meet the needs of the railways, power stations and industrial and domestic consumers in that order of priority. Chairman of the committee is Dr. F. J. de Villiers (industrial adviser to the Department of Commerce and Industries), and the other members include Mr. C. G. Downie, city electrical engineer of Cape Town, who will represent the interests of the municipal power stations.

Allocations for the Year

Power allocations to supply authorities in New Zealand for the year ending March 31, 1953, will be increased over the past year's allocation by 7½% in the North Island and 5% in the South Island. This advice has been sent to power authorities by the General Manager of the State Hydro-Electric Department, Mr. A. E. Davenport, who has pointed out that, because of excess consumption in the North Island during the current year, the overall effect of the 7½% allocation increase should be a reduction of 2½% on actual consumption for the year ending March 31, 1952. Reviewing the position in regard to the North Island, he estimated that generation up to March 30 was 13% above last year, but hydraulic conditions were 4½% below the average. In the South Island, generation was increased by 7% over the 1951 figure, and the water storage position was good, nearly all lakes being full.

The Power Problem

Many aspects of power supply were discussed at a recent meeting of the Minister in charge of the State Hydro-electric Department, Mr. W. S. Goosman, and the liaison committee of the Electric Supply Authorities' Association. Mr. Goosman afterwards stated that every endeavour was being made to obtain an output of 30,000 kW from Maraetai by the end of October next, and the full output of three machines (108,000 kW) about the end of January, 1953. At Cobb, it was planned to have the new machines in operation by the middle of 1953, although a wet summer next year could upset the programme. There was every prospect of completing the addition of two machines at Waitaki in 1954. Tenders would close next June for the construction of the Roxburgh power station, and there was a possibility that power from Roxburgh would be available during 1955. It was expected that the new Waipori plants would begin operation in 1953. He said the geothermal boring results had been very good so far, but new drilling rigs were awaited.

1952 Plans

The Indonesian Ministry of Public Works and Power has allocated a sum of 110 million rupiahs to expand the country's electrical power plant during 1952. The N.V. Nivem has been ordered to begin with the second stage in the reconstruction of the Kali-Konto power plant, and has also been entrusted with the construction of a diesel-driven generating plant at Ngagel, near Sourabaya. A sum of about 50 million rupiahs has been earmarked for these plans, we understand.

PERSONALITIES

IN THE INDUSTRY

At the annual general meeting of the British Electrical Development Association last Friday, **Dr. Percy Dunsheath,** C.B.E., M.A., M.Inst.C.E., M.I.E.E., was appointed president of the Association for 1952-53 in succession to **Lord Citrine,** P.C., K.B.E., Comp.I.E.E., chairman of the B.E.A., who has held that office for the past four years. At the meeting of the Council which followed, **Mr. H. Nimmo,** M.Inst.C.E., M.I.E.E., M.I.Mech.E., (chairman of the Southern Electricity Board) was elected chairman of the Council in succession to **Mr. C. T. Melling,** M.Sc., M.I.E.E., M.I.Mech.E. (chairman of the Eastern Electricity Board). The new vice-chairman of the Council is **Dame Caroline Haslett,** D.B.E., Comp.I.E.E., director of the Electrical Association for Women and a vice-president of E.D.A.

Dr. P. Dunsheath

Mr. H. E. Johnson, superintendent electrical engineer of the Ford Motor Co., Ltd., Dagenham, has just retired after completing 37 years with the company. Our accompanying photograph, taken at a farewell ceremony, shows Mr. Johnson on the right, receiving a presentation from Sir Rowland Smith, chairman of the company. Mr. Johnson is succeeded by **Mr. E. Frost,** Assoc.I.E.E., who has been with the company since 1931. During the war, he was superintendent electrical engineer at the company's shadow factory at Manchester.

Mr. H. E. Johnson, right, receives his presentation from Sir Rowland Smith, at the Dagenham ceremony

Mr. H. Lythgoe Reddyhough, M.I.E.E., M.Inst.F., consulting engineer to the Gourepore Electric Supply Co., Ltd., in London, who was recently appointed a director of Kalgoorlie Electric Power and Lighting Corporation, Ltd., was also elected to the board of directors of the Electric Supply Corporation (Overseas) Ltd. His friends at home and abroad will be interested to learn that Mr. Reddyhough is shortly proceeding on a world tour on behalf of the various undertakings with which he is connected. He is leaving next week end by air for Pakistan, and will subsequently visit India, Malaya, Thailand, Indonesia, Hong Kong, Australia and Tokyo, returning to England via Canada.

Mr. G. S. Causon and **Mr. A. E. Nicol,** who have been in the employ, in various positions, of the Hackbridge and Hewittic Electric Co., Ltd., for nearly 25 years, have been appointed directors of the company.

Further changes in the Engineering Division are announced by the B.B.C. **Mr. F. Axon,** D.C.M., is now senior superintendent engineer, external services; **Mr. F. Williams,** B.Sc.(Hons.), M.I.E.E., has been appointed senior superintendent engineer, home broadcasting; **Mr. H. G. Whiting,** A.M.I.E.E., has relinquished his post as engineer-in-charge of the Sutton Coldfield television transmitting station to become assistant engineer-in-charge (television) at Birmingham, and finally, **Mr. R. C. Harman,** A.M.I.E.E., succeeds Mr. Whiting at Sutton Coldfield. Mr. Axon joined the B.B.C. in 1941 as a member of the Overseas and Ionosphere Section of the Overseas and Engineering Information Department, and became head of that department last year. Mr. Williams, who started with the B.B.C. in 1925, has been superintendent engineer studios since 1950. Mr. Whiting has served the Corporation for 20 years, and became engineer-in-charge at Sutton Coldfield in 1949, since which time Mr. Harman has been his assistant.

Mr. F. Williams

Professor W. J. Kearton, D.Eng., M.I.Mech.E., Dean of the Faculty of Engineering at Liverpool University, has been elected president of the Liverpool Engineering Society. Prof. Kearton is well known, of course, *inter alia*, for his published works on steam turbines, centrifugal pumps, and rotary compressors.

A recent arrival in this country is **Mr. T. C. Horne,** B.E., A.M.I.E.(Aust.), station and substation designs engineer to the Hydro Electric Commission of Tasmania. The main purpose of the visit is in connection with the design and manufacture of electrical equipment for the Wayatinah and Lake Echo power stations. He expects to remain in this country for about two years.

Bill Switchgear Ltd. have appointed **Mr. C. Gearing** as their sales representative, covering the area of Worcestershire, Gloucestershire and South Wales. Mr. Gearing has been connected with the electrical trade for many years; he has had experience in electrical contracting and was latterly area representative with Berrys Electric Ltd.

Mr. C. Gearing

Mr. W. F. Randall, B.SC., A.R.S.M., M.I.E.E., F.I.M., director of the Telegraph Construction and Maintenance Co., Ltd., will, at the invitation of the British Iron and Steel Research Association, act as chairman of the newly formed conjoint Committee of B.I.S.R.A. and the Electrical Research Association on Electrical Sheet.

Mr. E. G. Plucknett, director and joint general manager of Simplex Electric Co. Ltd., has flown to South Africa on a visit to their associate, Simplex Electric Co. (South Africa) (Pty.) Ltd. Mr. Plucknett, who will also be visiting the company's agents in South Africa, Rhodesia and East Africa, expects to be away about a month.

At present Midland organiser of the Association of Engineering and Shipbuilding Draughtsmen, **Mr. G. Doughty,** has been nominated general secretary of that Association. He will take over his duties on June 30, from **Mr. J. Young,** who is retiring. For some years, Mr. Doughty was a draughtsman with the General Electric Co., in Birmingham.

A farewell presentation was made in Brisbane a few days ago to **Mr. J. H. Hindman** who has now finally retired from the City Council's Electricity Department, of which he was general manager for many years. Mr. Hindman has been succeeded by **Mr. P. A. W. Anthony,** B.E., A.M.I.E.E., as we have previously recorded

Mr. E. S. Evans, general manager of Ekco-Ensign Electric, Ltd., left by air last week for an extensive tour of Australia, New Zealand, Ceylon and India, in order to study at first-hand the company's activities and progress in those countries. Mr. Evans will be particularly interested in the possible extension of manufacturing facilities in the Ensign Lamps' Australian factory.

For the past eight years head of the Department of Electrical Engineering at Loughborough College **Mr. Charles A. Brearley,** wh.sc., B.SC (ENG.) A.R.C.S., M.I.E.E., is to retire at the end of this month. Born in Halifax, he started his career in engineering as an apprentice in his father's works, and studied at the Imperial College of Science Technology. Later he worked in Berlin on electric traction and with the British Westinghouse Co. After war service he went to Loughborough College in 1919, and taught in the engineering departments and in the College School. He succeeded Mr. J. Driver as head of the Electrical Engineering Department in 1944. Mr. Brearley is treasurer of the East Midlands centre of the I.E.E. and has served on advisory committees of the City and Guilds of London Institute. He was recently the recipient of presentations from the Loughborough College staff of a pair of binoculars and a cheque. The many students who passed through Mr. Brearley's care will join us in wishing him all happiness in his retirement.

Mr. C. A. Brearley

The Minister of Fuel and Power has reappointed **Mr. A. N. Irens,** M.I.E.E., A.F.R.AE.S., as a part time member of the South Western Electricity Board.

Mr. James Oldroyd, T.D., M.A.(cantab.), A.C.I.S., has been appointed secretary of the British Electrical and Allied Manufacturers' Association, in succession to **the Hon. J. R. Rea.** Mr. Oldroyd takes up his new duties on May 5.

From Siemens Electric Lamps and Supplies Ltd. we learn that their radio representative, **Mr. A S. Dunstan,** attached to their Newcastle branch, is leaving to take up an appointment in Nigeria. In his place, **Mr. K. Pattison,** M.I.P.R.E., who will commence duties on May 1, will be representing the company on radio sales for the four northern counties.

Lord Burghley has accepted an invitation to be president of the Radio Industries Council, in succession to **Mr. Oliver Lyttleton** who relinquished the presidency on taking office in the present Government.

At the annual general meeting of the Norwich Centre of the Institute of Industrial Administration, **Mr. W. G. Weston,** A.C.I.S., M.I.I.A., the sub-area secretarial officer of the Norfolk Sub-Area, Eastern Electricity Board, was elected chairman of the centre. Mr. Weston was hon. secretary of the Centre from the time of its formation in 1947 until his election as vice-chairman last year.

Mr. F. R. Scarrott, who has been with Ranton and Co., Ltd., for 21 years, has been appointed sales manager of the company.

Mr. George Bowman, of the Carlisle electrical contracting concern of that name, is to be Mayor of Carlisle for the coming municipal year. He was elected to the city council 10 years ago, and became an alderman last year.

Mr. John R. Lovegrove has been appointed representative of Britmac Electrical Co., Ltd., to take over the Midlands area, which was previously covered by his father, Mr. C. S. Lovegrove, whose death is reported below.

OBITUARY

Mr. C. S. Lovegrove died on April 10. He represented Britmac Electrical Co., Ltd. for over 40 years, and up to 1938 covered the north of England, in addition to the Midlands—after this time his activities were confined to the Midlands.

Mr. R. B. Hague, managing director and founder of Hague and McKenzie, Ltd., died recently, aged 69. He played a prominent part in the development of flat-bottom aluminium utensils primarily for use with electric cookers.

Mr. J. R. Hawkes, principal of the Leicester electrical contracting concern of that name, died on April 13, aged 43.

Mr. H. Dawson Roberts, commercial manager to the affiliated manufacturers' associations of the Cable Makers' Association, died on April 11, aged 59. Prior to taking up that post late in 1943, he had been a senior executive officer of British Insulated Callenders' Cables Ltd., having originally joined the former B.I. and Helsby Cable Co. after the 1914-18 war. He held a senior position at the Helsby works until 1928 when he transferred to the London office of British Insulated Cables Ltd. He has been chairman of a number of committees connected with the cable making industry, and was a member of the Fair Trading Council for many years.

Mr. H. D. Roberts

Mr. Frank Craven, proprietor of W. P. Holt and Co., electrical contractors of Bradford, died last week aged 69. He was a former chairman of the Bradford branch of the Electrical Contractors' Association.

NEW LITERATURE

Principles of Electrical Engineering

by W. H. Timble and V. Bush

NOW appearing in its fourth edition, some thirty years after it was first printed, this American text-book can justly claim to be well established. It covers a university first course in electrical engineering, and has as its principal distinguishing characteristic a relation of mathematical physics to practical problems that is perhaps somewhat closer than usual in such works. From the narrowly didactic viewpoint, a valuable feature is the inclusion at the end of every chapter of a terse summary of principles established and formulae developed, while a good selection of problems is provided to test the student's understanding of what he has read. Published by Chapman and Hall, 626 pages, 8½ in. by 5½ in. Fourth edition, price 52s.

Wireless and Electrical Traders' Year Book

MANY in the trade are already familiar with this hardy annual, and will welcome the 1952 edition with its up-to-date information which follows the pattern of its predecessors. But for others who have not had recourse to its pages we should explain that its emphasis is primarily on the radio trade, although in its useful classified buyer's guide and trade marks sections many domestic appliances are included. There is again listed the specifications of current radio and television receivers, valve-base diagrams, i.f. values, trade associations, and some useful legal information related to the radio and electrical trade, to give good value for money. Published by Trader Publishing Co., 266 pages, 8¼ in. by 5¼ in., price 10s. 6d.

BOOKS RECEIVED

Newnes Electrical Pocket Book, edited by E. Molloy. Revised and brought up to date. Published by Newnes, 375 pages, 6¼ in. by 4 in. 11th edition, price 8s. 6d.

Hydraulic Research in the United States. Lists current research investigations, with brief details of progress, results and of associated publications. Includes work in Canada. Published by the National Bureau of Standards and sold by the U.S. Government Printing Office, Washington 25, D.C. 190 pages, 10 in. by 7¾ in. Price 1 dollar 25 cents.

Modern Electrical Contracting by H. R. Taunton. Deals with the commercial side of a contracting business, as distinct from its engineering technicalities. Published by Iliffe and Sons, Ltd., 176 pages, 8¾ in. by 5¾ in. Price 10s. 6d.

Fluorescent Lighting, ed. by Z. Zwicker. Various contributors review principles of operation, characteristics, and operation. Published for Philips by the Cleaver-Hume Press, 248 pages, 9 in. by 6 in. Price 35s.

Transient Electric Currents, by H. H. Skilling. Treats general methods of solving transient problems, including Laplace transform. Published by McGraw-Hill, 361 pages, 9 in. by 6 in. Second edition, price 51s.

Electricity and Productivity

A.S.E.E. MEMBERS CAN EXTEND FACTORY APPLICATIONS

MEMBERS of the A.S.E.E. are in a strong position to help improve industrial productivity by judicious electrification, suggested MR. C. T. MELLING, M.SC., M.I.E.E., M.I.MECH.E., in a lecture which he delivered to the Association on Tuesday last. Each individual factory and workshop warranted examination, and there was a possibility of making a satisfactory improvement in most cases by small doses of capital in the form of new electric drives or new control methods of existing tools.

It was fair to say that if factory methods and techniques had not been examined in the last two years, there was scope for further improvement. If, on the other hand, the methods currently in operation were those practised twenty years ago, there was no doubt that further electrification of the factory could give a handsome return in increased productivity.

Electrical engineers were not required to boost the use of more electricity as a means in itself. The need was to use electricity to its best advantage, and in this respect there was scope for examinations of the kind recommended even when markets were not expanding, and when the emphasis was on reduced costs rather than higher productivity.

One problem which faced the works engineer in implementing any such scheme for critical examination was that of obtaining concise information. Plenty of data was available, but it was in general spread thinly through a large mass of literature. The E.D.A. had this difficulty very much in mind and they were examining how far they could assist by the production of comprehensive books, films and other data to assist the country's drive for greater productivity. It was hoped that one at least of the books would be published during 1952. This, once again, was not just an attempt to secure greater sales of electricity. E.D.A. regarded its function as being to encourage the proper use of electricity in the national interest in all its various aspects. It was striving towards a solution of the art of getting the best possible value to the national benefit from available resources in the electrical field.

ELECTRICITY USED IN VARIOUS INDUSTRIES

Industrial Groups	kWh/operative/year	kWh per pound's worth of product
Iron and steel	14,000	11·3
Non-ferrous metal... ...	12,500	
Engineering, shipbuilding and vehicles	2,500	2·3
Other metal goods... ...	3,000	2·3
Chemicals and allied trades	1,500	7·5
Textiles, clothing and leather	1,500	1·3
Food, tobacco and drink...	3,000	0·8
Paper, printing, etc. ...	4,000	4·0
Other manufacturing industries	4,000	—

Proved Methods

Earlier in his lecture Mr. Melling had reviewed statements of the Anglo-American Council on Productivity which discussed the importance of mechanisation, and in particular, of electrification. He gave a wide survey of the many ways in which electrification had proved successful in increasing output, and commented with special emphasis on the part electrical methods of heating could play in clearing bottlenecks.

Not to be overlooked when examining factory methods was the help electrical techniques, especially those utilising electronic apparatus, could give to inspection. Non-destructive methods of test had entirely revolutionised the procedure adopted in some industries.

Besides their attention on electrical equipment, that already existed, electrical engineers could also help productivity by keeping a close watch for opportunities of better factory layout and planning. Particular possibilities exist with regard to methods of transferring products from one machine to another, for if these could be made automatic, a saving in labour of 50% or more could often be made.

TIN RESEARCH REPORT

IN the annual report of the Tin Research Institute for 1951, issued last week, details are given of the research work being conducted at the new laboratories of the Institute. Amongst matters of particular interest is an investigation into a tin-nickel alloy plating process which gives a "beautiful metallic lustre with a faint rose-pink colour," which is hard, bright and untarnishable. Pilot plant scale work has been conducted by the Institute, and the new process has been found suitable for electrical appliances.

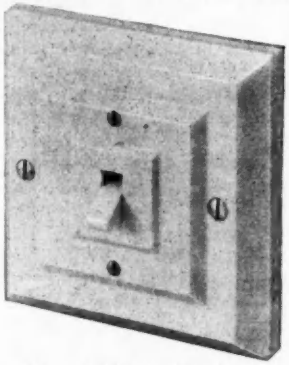
One result of the present shortage of nickel is a renewed interest in tin bronze condenser tube into which investigations have been conducted for some years.

The BUYER'S *Column*

Surface Mounting, Yet Flush!

LATEST introduction to appear very shortly is the "Surflush" tumbler switch designed and produced by FALK STADELMANN AND CO., LTD., 91 Farringdon Road, London E.C.1.

An ingenious, and shallow a.c. only switch action is mounted within a plate to give a final depth very little more than that associated with a standard flush switch, but the switch is surface, requiring only two screws to fix it direct on to the wall. It needs no block or box, and when so mounted it conforms to the relevant specification of the 12th Edition I.E.E. Wiring Rules.



This "Surflush" switch introduced by Falk Stadelmann is surface mounting yet has all the virtues of a flush switch

Every facility is given for easy wiring, including eight cable knock-outs and six alternate blind holes for fixing.

The mechanism of the switch is a simple flat spring design, the contacts being rolled silver and dimpled to reduce flash and pitting.

The switch is manufactured in one and two gang with one or two-way switches in brown and white. It is all insulated and produced from non-tracking powder. The switch action is also available as a separate replacement unit should the occasion arise.

The list price is 48s. per dozen, 3s. each net. The replacement unit will sell to the trade at 1s. 9d. net.

Specialist Barrier Cream!

GENERALLY associated with cosmetics and the beauty parlour, the name of INNOXA LABORATORIES, of 1 Eden Street, N.W.1, has now been given to a range of specialist barrier creams for use in preventing the skin disorders unfortunately prevalent in many branches of industry.

These industrial barrier creams known overseas as "Kerodex" creams, are the products of extensive research. There are eight varieties, divided into water repellent creams (BW) and water soluble creams (BD). The BW series gives protection against acids, alkali and other irritants soluble in water. One application of the creams lasts for three to four hours and gradually wears off. Being water repellent, they do not wash off.

The BD series ensures protection against various specified irritants in oils, paints, tars, enamel, creosote, solvents, etc. These creams expand violently in contact with water, pushing off all superimposed grime and are consequently removable by washing in the normal way,

Principal virtues of the range are (a) they resist irritant materials penetrating the skin, (b) their reinforcing sustains the durability of the creams which are not affected by abrasion, (c) they are said to contain certain agents which stimulate action of the natural skin lubricants and which help repair moderate surface damage, and (d) they are deeply penetrative and have a bacteriostatic action against infection.

The "Floralite"

TO provide adequate soft background illumination for general living conditions and in special applications such as televiewing and the sick room, CREASEY AND CO., 1 and 2 Regent Square, London W.1, have introduced the Floralite, a flower vase illuminating bowl.

The main body of the fitting comprises two aluminium spinnings which are anodised and are available finished in pink, gold, green, blue, red and black. Mounted between these two spinnings is a b.c. lampholder which takes a 15 W pygmy lamp or 25 W tubular lamp.

Light is reflected upwards, causing a very pleasant lighting effect taking full advantage both of the design of the vase with flowers standing in the centre bowl.

Overall diameter of the Floralite is 8½ in. and the height 4¼ in. With three yards of flexible cable supplied, the cost of the unit is £2, which includes 7s. 3d. purchase tax.

The "Floralite" unit is reasonably priced yet affords a wealth of colouring

New Simplex Flameproof Switchgear

MOST recent additions to the range of flameproof equipment supplied by SIMPLEX ELECTRIC CO. LTD., Broadwell, Oldbury, Birmingham, are miniature switch fuses and miniature busbar chambers.

The switch fuses have 5/15 amp switches and 5/15 amp cartridge as standardised under B.S. 1361. The fuse compartment cover is interlocked with the switch mechanism, preventing opening whilst switch is in circuit. The switch fuses are obtainable for use with armoured cable or conduit or combinations of both.

The busbar chambers are double-pole as standard, maximum capacity is 60 amps. Each chamber can receive two switch fuses above and two below. Incoming cables can only be led to the busbars from the ends, a special terminal box having been designed for this purpose. Cable or conduit can enter from top, below or horizontally.

All units are provided with earthing screws and washers, and are finished as standard in black stove enamel or galvanised.

Time Switching Success

A UNIT which has been well received in this country by lighting engineers and industry in general since its recent introduction by VENNER, LTD., Kingston Bypass, New Malden, Surrey, is the type T.J.S.P. time switch.

This unit is an electrically wound time switch which has spring reserve power to maintain the clock during periods of shut down in mains supply. It is not affected by frequency variation.

Compact size of the unit, 4$\frac{13}{16}$ in. wide and 7 in. long inside its stout metal casing, makes the switch particularly suitable for lamp columns, sign bollards and in other restricted spaces.

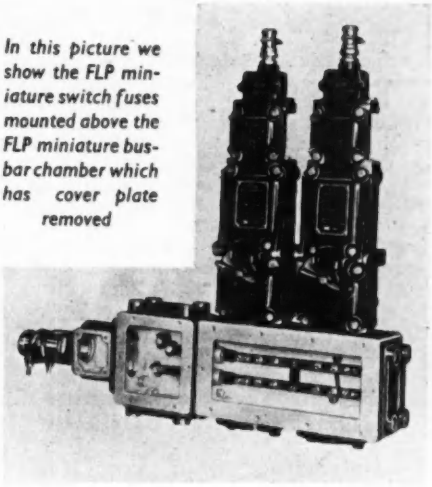
The time piece and switchgear comprise an integral unit plugging into the main case terminal compartment. The switch can be removed or replaced conveniently without disturbing the box on site.

Winding is effected automatically by high torque synchronous motor, connected through suitable reduction gearing to the arbour of a spring barrel. Once fully wound the clock has a reserve of eight hours guaranteed minimum.

Time keeping is controlled by a high quality 11 jewel lever escapement with Brequet overcoil and a balance fully compensated for temperature variation.

The switch can be supplied with hand set or solar compensating dial. The solar dial is of a new design, larger and more robust than usually supplied with small switches of this type. Each dial is accurately plotted and cut to close approximation of true solar time for the area where the dial will be used. The switchgear is of single pole type with fine silver contacts. These can be conveniently replaced if required.

The switch is provided with facilities for manual operation independent of the clock, and is suitable for a.c. supplies of 100/110 volts or 200/250 volts. Surge currents should not exceed 70 amps., otherwise contact life may be reduced.



In this picture we show the FLP miniature switch fuses mounted above the FLP miniature busbar chamber which has cover plate removed

Bylock Spray Gun Adaptor

A NEW feature has been introduced with the Mark II Spray Gun which BYLOCK ELECTRIC, LTD., South Street, Ponders End, Middx., have been put on the market.

A new rubber adaptor ensures a perfect fit on most low-pressure air lines.

This gun which has adjustable jet-control makes paint, distemper, cellulose spraying a matter of extreme ease and simplicity. Complete with three jets, jet-spanners and spare washers, the gun is priced £1 7s.

TRADE PUBLICATIONS

LIGHTING FITTINGS.—Revised leaflet IF 5/51 dealing with both weatherproof and watertight industrial well glass and bulkhead fittings is now available from Wm. McGeoch and Co., Ltd., Warwick Wks., 46 Coventry Rd., Birmingham 10.

LAMPS AND LIGHTING.—Fluorescent fittings publication F.1608 and catalogue section F(7) have been brought up to date by the issue of a new price list effective April 1 by the General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.

METERS.—House service meters, type UKE, are featured in a new English Electric publication obtainable from Queen's House, Kingsway, W.C.2, and branches.

CONDENSERS.—"Lectroflash" electrolytic condensers type SCE.60.PE, for electronic flash photography are described in a new technical bulletin issued by the Telegraph Condenser Co., Ltd., Wales Farm Road, North Acton, W.3.

T.V. COMPONENTS.—The greatly increased range of television components of the Plessey Co. Ltd., Ilford, Essex, is described in detail in a new 24-page catalogue.

BRITISH STANDARDS

Colour Code for Fixed Resistors for Telecommunication Purposes. *B.S. 1852 : 1952. Price 1s.* The internationally agreed colour code for resistors of the type often used for telecommunication purposes is set out here. The colour code has been in use in this country and elsewhere for several years and is based upon that originated by the Radio Manufacturers' Association of America. The standard specifies the colours to be used and describes alternative methods of marking; the coloured band method is given as the preferred method. The standard does not preclude the continued production of resistors on which ratings are indicated in a non-coded form.

Transformers for Cinematograph Sound Equipment. *B.S. 1793 : 1952. Price 2s.* This Standard is part of a series in course of preparation for electrical equipment for use in cinema buildings and studios. It covers transformers working over the audio-frequency range of approximately 30 to 10,000 cycles per second, and dealing with powers up to 1 kVA. Without imposing undue restrictions on details of design, it specifies such essential requirements for construction as will ensure safety in operation. Performance characteristics are specified, together with methods of test, including tests for transformers intended to be used under tropical conditions.

Bad Maintenance led to Mine Explosion

Introduction of New Regulations Suggested by Inspector

IMPORTANT recommendations regarding the use of flameproof electrical equipment in mines are made in the report by Mr. R. Yates, H.M. Deputy Chief Inspector of Mines, on an explosion at Eppleton Colliery, Durham, last July. In this explosion seven men were killed outright and two more died later from injuries which they had received.

It is believed that the explosion was caused by sparking in the control box of a Joy loader, which ignited an accumulation of firedamp that had resulted from a slight disturbance in the mine ventilation system. The loader was fitted with an adaptor box to allow B.S. standard plugs to be used with this American machine. A flange and spigot machined joint with four studs held the adaptor to the machine, and a strengthening angle bracket was provided. None of the studs was in position, and the spigot joint had opened to leave a crescent-shaped gap in the side of the control unit. This gap was found experimentally to pass flame readily in an inflammable air/methane mixture when a spark initiated combustion.

U.S. Equipment below Standard

Mr. Yates considers that the moral of the explosion is undoubtedly that the use in safety-lamp mines of all electrical apparatus not up to British flameproof standards should be stringently reviewed. Some American equipment is not up to this standard. It is recommended in the report that the principle of British flameproof standard equipment being used at or within 300 yards of the coal face in all safety-lamp mines should be accepted, and that steps should be taken to conform to this standard as soon as possible. As this would be long-term policy, immediate steps should be to forbid the use of electrical equipment not up to British F.P. standards anywhere near the coal face in safety-lamp mines unless there is clear proof that no gas exists, and to forbid the use of shuttle cars in certain conditions in such mines.

Regulations up-to-date

Electricity regulations at present applying to mines are those made in 1913, and although they have served the industry well, amending regulations are long overdue. Draft regulations exist, and the Inspector considers that statutory effect should be given to them as soon as possible. Status and certification of electricians are matters on which a Royal Commission commented in 1938, and as it is understood that early effect is to be given to their recommendations, there is no comment in this report. Good maintenance might have prevented the accident, but the corollary of good maintenance is soundly constructed apparatus. Some American products are not up to the standard of British plant in this respect. It was noted that Arcwall coal cutting machines constructed to British standards and subjected to equally as rough usage as the Joy loaders were found to be in safe working order after the explosion.

Frequent inspection of electrical equipment used at the coal face is recommended, together with a revised type of log book for keeping a record of such inspections. At the mine where the explosion occurred, it was apparent that inspection of equipment was made only sporadically.

The WEEK in NEWS

WAGE CLAIMS
in Supply Industry

CLAIMS for a 10% increase in salaries to employees in the electricity supply industry, with effect from March 1, 1952, have been made to the National Joint Board and the National Joint Council. Similar claims were put forward by the E.P.E.A. on behalf of the technical staff, and by N.A.L.G.O. for the clerical and administrative grades. The matter has been left for consultation between the Boards. If necessary, special meetings of the N.J.B. and the N.J.C. may be called, but it seems likely that the matter will come before the normal meetings on May 13. In regard to the "fourth leg," for which salary scales are still under discussion, the A.M.E.E. has asked for a 15% increase on the present provisional salaries for the managerial and executive staff, we understand.

. . . *and in the Engineering Industry*

WAGE claims for engineering apprentices were settled last week after discussions between the Engineering and Allied Employers' National Federation and the Confederation of Shipbuilding and Engineering Unions. The increases range from 5s. 6d. a week at the age of 15 to 11s. at 20, and will become operative as from Monday next.

These young workers received a proportionate increase in the general wage settlement last November, but an additional claim for an extra £1 a week was submitted two months ago on the grounds that special consideration should be given to the value of junior workers in industry. The new increases, besides those already mentioned, are 6s. 3d. at the age of 16, 7s. 4d. at 17, 8s. 3d. at 18 and 10s. 1d. for 19-year-olds.

Cinema Regulations Suspended

Rules made Last Year too costly to Enforce

REGULATIONS published early last year for the electrical equipment of cinemas have been suspended by a statutory instrument, 1952 No. 1947, issued by the Home Secretary. Under the provisions of this document, the 11 clauses of the 1950 regulations (S.I.1950 No. 2133) which deal with the general electrical installation of cinemas will now be replaced for the time being by the appropriate clauses of the Cinematograph Regulations of 1923 (S.R. and O. No. 983-1923).

Under the 1950 Regulations, it was required that all installations should conform with the new clauses by January 1, 1953. This date is now abandoned as regards clauses 12 to 22. Those parts of the 1950 Regulations which relax the 1923 rules (i.e., as regards safety lighting) and which cover new ground (i.e., television in cinemas) will continue to apply.

The new Instrument makes minor amendments to two clauses which it allows to stand. In one of these there is a provision about failure of control equipment for lighting, and in the other a requirement that automatic change-over switches for connecting safety lighting shall be tested regularly.

It is understood that the immediate reason for suspending the regulations is that they would require in their realisation heavy capital expenditure and the use of scarce materials. Probably at a later date the suspended parts of the 1950 Regulations will be applied.

NEW ARRANGEMENT FOR INTER-FACTORY TRANSFER OF PLANT

THE Ministry of Works issued a statement last week concerning extra facilities now provided by annual maintenance licences. It is pointed out that arrangements can be made for these licences to cover minor works of alteration which follow either the installation of new machinery or the transfer of machinery from one factory to another. This will be in addition to the previous arrangements covering transfer of machines in the same works.

The Ministry also states that current licences will be appropriately amended to cater for these new concessions if application is made by firms to the Ministry's Regional Licensing Officers.

The First Half-Century

Few articles of general utility undergo so many processes in their manufacture as the familiar electric incandescent lamp. Its simplicity of form would make one incline to the belief that its method of construction must be equally simple, for it apparently consists of merely a glass bulb, a carbon filament, and a brass cap. When it is remembered, however, that a lamp has to pass through as many as twenty-six distinct operations before the glass tube from which it originates is transformed into a bulb fitted with filament and terminals, it will be admitted that its manufacture requires very considerable skill and experience.
From our issue of April 24, 1902.

INSTRUMENT SHOW FOR PHILADELPHIA IN 1954

AN announcement concerning the first International Instrument Congress and Exposition was made recently by Dr. A. O. Beckman president of the Instrument Society of America. The congress is to take place in the Commercial Museum and Convention Hall, Philadelphia, between September 14 and 24, 1954, and invitations are to be extended to both U.S. and foreign manufacturers to exhibit the latter through appropriate Embassies. It will provide a suitable form of celebration to mark the tenth anniversary of the Instrument Society.

The exhibition will set out to draw attention to the large part instrumentation is playing in raising the standard of living. Further information may be obtained from Richard Rimbach, managing director, 921 Ridge Ave., Pittsburgh 12.

HIRE PURCHASE AMENDMENTS

AN amendment was published last week to the Hire Purchase and Credit Sale Agreements (Control) Order, but little, if any, change has been made in arrangements, particularly as regards electrical goods. The main alteration has been the inclusion of Northern Ireland within the scope of the original order. Other than this certain changes have been made in relation to mechanically-propelled road vehicles, but not as regards electrical goods.

The scene outside Hurseal's Regent Street showrooms which shows how passers-by have been attracted by the "economy" display of Venner Ltd.

Space Heating Confined to Off-Peak Times

DESPITE the fact that there were comparatively few power cuts in the country last winter, it was probably due mainly to the mild weather, and it would be foolish to presume that our power problems were solved. Any steps therefore which can be taken to lessen the risk of future cuts must be seriously considered, and the best time to do this is during the summer months.

Venner Ltd. are in the field early with their suggestion which comprises a display in the Regent Street showrooms of Hurseal Ltd., under the slogan "Set and Forget." A clock face has been marked with peak times and, as the hand moves round, electric radiators are shown as being switched on during off-peak periods. As the "peak" arrives the radiators are turned off and the lights in the factory on. Similar pictures show the same procedure in the home. The 24-hour daily cycle is completed in one minute.

The display provides a good example of how the time switch can help in the interests of fuel economy, and will do much to inform the public that electric space heating has many advantages provided it is used at the proper times.

Conference on Industrial Physics

THE fourth conference on Industrial Physics is to take place at the Royal Technical College, Glasgow, between June 24 and 28. The subject of the conference is "Physics in the Transport, Shipbuilding and Engineering Industries," and the organisers, the Institute of Physics, are arranging an exhibition of instruments, apparatus and books relevent to the subject. It is expected to be one of the largest displays of scientific instruments and apparatus seen in Scotland. The programme includes lectures on metal physics, meteorology, education and training of industrial physicists in Scotland, sound reproduction, physics in transport, automatic control of industrial processes and noise and its suppression.

OFFICIAL PUBLICATIONS

HIRE-PURCHASE AND CREDIT SALE AGREEMENTS (CONTROL) (AMENDMENT) ORDER, 1952. S.I. 724. (*See this page.*) H.M.S.O. 3d.

CINEMATOGRAPH REGULATIONS, 1952. S.I. 727. H.M.S.O. 2d. (*See page* 773.)

EPPLETON COLLIERY. *Report on explosion.* Sold by H.M.S.O. 2s. 6d. (*See page* 772.)

N. OF SCOTLAND H.-E. BOARD. *Statement of Guarantees given by Treasury on loans raised during* 1951-52. H.M.S.O. 2d.

BRITISH STANDARDS.

B.S. 1793: *Transformers for Cinematograph sound equipment*

B.S. 1852: *Colour Code for fixed resistors for telecommunications purposes.*

B.E.A. *Statement of Guarantee given by Treasury on Mar.* 26 *on loans proposed to be raised. Amount now involved is* £140 *million covering period up to Apr.* 30.

ECONOMIC SURVEY 1952 H.M.S.O. price 1s. 3d.

Public Speaking Prizes Go To North-West

Chorley District wins both Shields

THE honours in this year's public speaking competition, organised by the Electrical Development Association, and held in London last Thursday, have undoubtedly gone to the Chorley district of the N.W. Electricity Board. That district supplied the winners of both the men's and women's sections of the contest, and the Board will therefore hold both the Faraday Silver Challenge Shields throughout the coming year.

Winner in the men's section was Mr. M. Hall, who chose as his subject, "Was the Festival of Britain Justified?" The runner-up, Mr. A. J. Begbie, of the South Western Board also chose that subject, but Mr. K. Prescott of the Yorkshire Board spoke on "What I mean by Freedom of Choice." In the women's section both the winner, Miss Muriel Shorrock, and the third prizewinner, Miss Elizabeth Crowther, of the South Western Board, chose to speak on "What I mean by Freedom of Choice." Miss Mary Cumming, of the S.W. Scotland Board, second, spoke on "Should Housing Estates be All-Electric?"

Seating accommodation provided for the competition was filled to capacity and it was agreed that the standard of speaking was the highest yet achieved in the contest since its inception in 1933. This is the first time that representatives of the N. Western Board have won either the men's or women's trophy.

SECOND ELECTRONIC BRAIN IS SHIPPED TO TORONTO

A SECOND electronic computor has just been shipped to Canada by the makers Ferranti, Ltd. It is destined for the National Research Council of Canada and closely resembles the "electronic brain" which was installed in the University of Manchester nearly a year ago. The latest machine will be erected in the University at Toronto, and includes a number of improvements which are expected to give a better result than its Manchester counterpart.

The first "brain" has proved most successful, working 24 hours a day on a variety of problems. It is being used to perform complex scientific and engineering calculations which involve a vast amount of computation. These machines have been developed by Ferranti, Ltd., from the work of Prof. F. C. Williams in the electrical engineering department of Manchester University.

SOME FACTS ABOUT EXPORTS TO CANADA

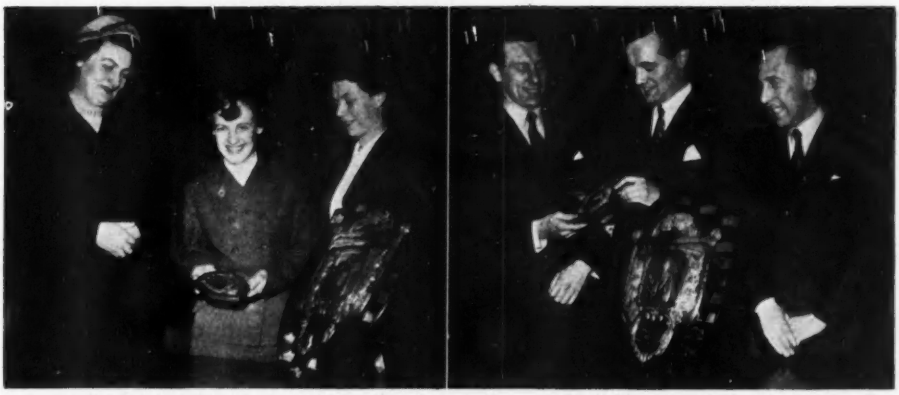
SOME indication of the pattern of British electrical exports to Canada during 1951 has been given in a study, published earlier this month by the Dollar Sterling Trade Advisory Council. Broadly, progress has been made in the export of machine tools and the heavier type of equipment, but there has been a decline in the market for consumer durables, exemplified in the report by reference to sewing machines and vacuum cleaners.

It was reported that gains of between 75% and 100% were made in such items as diesel engines, machine tools, precision tools and electrical equipment. The export of dynamos and generators was said to have risen by 170% while transformers were up by 50%.

New Branch of P.O.A. Formed in Melbourne

THE Purchasing Officers' Association has informed us that a new branch of that organisation has been formed in Victoria, Australia. Up to the present, 33 applicants have been elected to membership of the new branch.

This is the second branch of P.O.A. to be inaugurated outside the U.K., the first being at Natal (S. Africa).



Winners of E.D.A.'s Public Speaking Competition in both the women's (left) and men's (right) sections. Our picture of the successful women shows from left to right: Miss Mary Cumming, second, Miss Muriel Shorrock, first, and Miss Elizabeth Crowther, third. From the left in the men's photograph are Mr. A. Begbie, second, Mr. M. Hall, first, and Mr. K. Prescott, third

Gas Council Criticises Electricity Charges

IT is not often that we report proceedings of Gas Consultative Councils in these columns, but at a recent meeting of the Scottish council in Edinburgh criticism was made of Electricity Boards' practice of installing electricity in "all-electric" houses at a lower cost than those in which gas was also installed. In S.W. Scotland, it was stated, the charges were £15 if gas was to be used and £3 for an all-electric house.

These, and similar particulars in other parts of Scotland, are to be sent to the Minister of Fuel and Power and Scottish Gas Board with the assertion that the system was unfair and contravened the principle that tenants should have a free choice between gas and electricity. It was suggested that the arrangement between the N. of Scotland Board and Aberdeen whereby a flat rate of £5 per house was charged and the matter left there, should be adopted.

Coincidental with the above complaint a particular instance of this practice was cited by Aberfeldy's town clerk at a meeting of Perth and Kinross Small Burghs' Association. The N. of Scotland Board had informed the burgh if the 20 houses in a new scheme were made all-electric there would be no charge, but if electric cookers were not installed the council would have to pay a capital contribution of £1,030. This proposition was described as "public blackmail."

Replying to the above charge, the Board has pointed out that the actual cost of installation in the 20 houses was £1,430. Revenue received from the sale of electricity for lighting, radios and the like was small in relation to outlay, and the Board would lose a substantial sum, if supplies were provided for these purposes. If cookers were installed, full use was made of the service and the revenue obtained was usually sufficient to pay for the supply.

Four-Year Course for School-Leavers

THE interest and enthusiasm shown in the four-year scholarship course in electronics run by E.M.I., Ltd., since its inception two years ago demands the scheme's continuation. Consequently the company has announced that the next course is due to start on October 14 next and that applications should be lodged with the Principal, E.M.I. Institutes, 10 Pembridge Square, London W.2, by August 29.

Training is offered to boys about to leave school who have attained a reasonably high standard of education. It comprises three years at the Institutes for theoretical and laboratory studies and also two separate periods of six months spent in the company's workshops and laboratories.

TO THE MEMORY OF SIR EDWARD MacCOLL

This plaque in memory of the late Sir Edward MacColl was unveiled at Pitlochry power station last week by Lord Cooper, Lord Justice General. Sir Edward will always be remembered as the pioneer of Scottish hydro-electric development. He was deputy chairman and chief executive officer of the N. of Scotland H.-E. Board from its inception in 1943 until his untimely death in June last year

BRITISH PAVILION AT ZAGREB FAIR

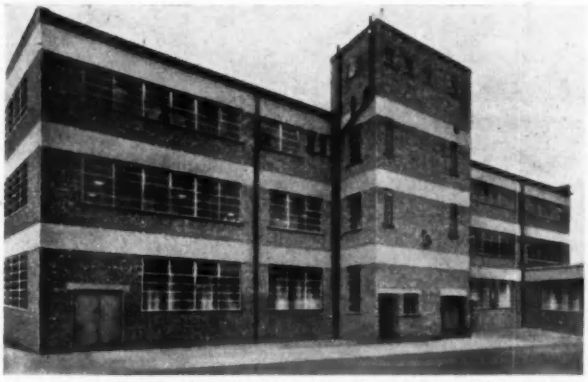
FOLLOWING inevitable cuts in exports to the Dominions it may be that British manufacturers will turn to other markets in order to dispose of surplus goods. Thus foreign trade fairs become increasingly important and we note that one such exhibition, the Zagreb International Fair, is to take place this year between September 13 and 28.

This year, for the first time, there will be a complete British Pavilion at the Fair comprising some 60 stands. It is being organised by Home and Overseas Trade Fairs of 40 Gerrard St., London W.1, the Fair's U.K. agents who are prepared to receive all inquiries and make all arrangements for intending exhibitors. The principal commodities in which Yugoslavia is most interested are capital equipment, industrial machinery, mining equipment, textile machinery, electrical equipment, machine tools, precision instruments, radio equipment and diesel engines.

Association for Science Students

THE Overseas Science Students' Association, whose object is to bring graduate science students from overseas into contact with scientific life in this country and with each other, has now been formed, and its executive committee elected. The proposal that such an association should be formed was made last February. It is affiliated to the Society for Visiting Scientists at 5 Old Burlington Street, London W.1., and meetings are to be held in that building.

President of this new association will be Mr. W. J. De Coursey, of Canada, and secretary Mr. P. Sen, of India. It is notable that among the countries represented on the committee of nine are South Africa, the United States, Ceylon, Yugoslavia, Iraq and Indonesia, but not Great Britain. We understand that to date about 100 overseas students have joined.



Our photograph shows the recently completed extension to Bill Switchgear Ltd's factory Aston Lane, Perry Bar, Birmingham

DEMONSTRATORS TO CONFER AT BUXTON

WITH the object of raising the standard of public demonstrations and home service work, the North Western Electricity Board is holding a conference of Service Centre demonstrators at Buxton, next week. There will be eight papers altogether and a final summing-up on the Wednesday morning. A special feature of the conference will be the syndicated discussion. Each speaker is to provide a synopsis of the papers, copies of which will be circulated, and then pose three questions for consideration by the syndicate.

Proceedings will open on Sunday evening when the Board's Commercial Officer, Mr. N. H. Bridge will lecture on "Electricity's Rightful Place—Answer to Popular Fallacies." There will be three papers on the Monday. These will be on "Improving Demonstration Speech—Effective Speech and Action," "A Model Cooker Selling Demonstration" and on "The Point of View of Housewife and Hostess."

A lecture on "Popularising Cold Cookery," by Miss M. Patten will occupy Tuesday morning, while the remainder of that day is to be devoted to three short talks by sub-area demonstrators.

Radio and TV Sales Continue to Fall

SALES of radio and television sets continued to fall during February, according to the latest R.T.R.A. sales index, just issued. This follows what the Association described as a bad month during January, and the latest figures do not make for encouraging reading when compared with the same period last year. The average number of radio sets sold per shop in February was 7·73, a fall of 1·32 on the preceding month, and a fall of 5·02 on February 1951. As regards television sets 11·15 were sold per shop last February, as compared with 12·51 in January and 12·12 in February 1951.

NEWS IN BRIEF

We understand that work is about to start on the erection of a light machine shop, offices and apprentices' training school for C. A. Parsons and Co., Ltd.

Speaking at the conference of the Association of Engineering and Shipbuilding Draughtsmen at Edinburgh last week, Mr. L. A. Williams said he deplored the fact that the E.P.E.A. was the only union allowed to negotiate for draughtsmen employed by the B.E.A.

Attendance at the Electrical Economy Exhibition at Inverness was well over 10,000.

Chief Technical Assistants' Association held their 37th annual dinner at Kettner's Restaurant, London, recently.

A party of over 300 employees from the G.E.C.'s Witton works went on an outing to the Continent over the Easter holiday. They visited Ostend, Ypres, Paris and Cambrai.

The sum of £125 was collected at the recent annual meeting of the Electrical Wholesalers Federation for the funds of E.I.B.A. A member of the Yorkshire section offered to double it and his offer was accepted.

A plaque in memory of Marconi is to be affixed to 71 Hereford Rd., Paddington, by the L.C.C. tomorrow. The pioneer of wireless communication lived at that address in 1896 and 1897.

Recent addition to the neon lights of Piccadilly Circus is this sign supplied and installed by Franco British Electrical Co., Ltd. It is fully animated. Fluorescent tubes representing the spectrum, light up individually. The name "Paripan" is then illuminated in red, followed by the remaining words in blue

Electric Supply News . . .

Durham

The l.t. networks which passed to the National Coal Board are to be transferred to the Area Boards of the B.E.A. This national policy of the N.C.B., which has been agreed centrally, was announced on Saturday last at a meeting held at Easington, Co. Durham, to discuss the inadequacy of electricity supplies to parishes in the rural council area, and ways of improving them. The meeting was attended by representatives of the N.C.B., the Electricity Boards, Easington R.D.C., ten parish councils, and by Mr. E. Shinwell, M.P. The announcement was given in a joint statement issued by the N.C.B. and the Electricity Boards, in which it was pointed out that in Durham the transfer is a major operation. Over 100 networks passed to the Divisional Boards of the N.C.B., along with about 42,000 consumers. It is estimated that the majority of the networks will require major overhaul before they can comply with the Electricity Supply Regulations, 1937. Further, to comply with the regulations it will be necessary to re-wire many of the houses (perhaps as many as 40,000) and other premises before the North-Eastern Electricity Board will be permitted to supply from the reconstituted or replaced network. It is expected that the work will be completed in four or five years.

Eire

In the Dail recently, Mr. F. Aiken, Minister for External Affairs, on behalf of the Minister for Industry and Commerce, stated that the Electricity Supply Board had decided to proceed with the hydro-electric development of the Comeragh River, Co. Kerry. Examination into the practicability of establishing small generating stations, fired by hand-won turf or by turf produced by semi-automatic machines, had been undertaken by the Board, who were in consultation with Bord na Mona. This matter was being dealt with as one of urgency.

Glasgow

A £120,000 scheme for reinforcement of the 6,600 volt electricity network in the southern district of Glasgow has been approved by the South West Scotland Electricity Board. The scheme, which will take three years to complete, involves the construction of a large substation at Fairfield shipyard, the provision of new equipment at other five substations in the vicinity, and the laying of underground cables.

Keadby

The first of six 60 MW turbo-alternators at this new power station in the Yorkshire Division of the B.E.A. was put on commercial load a few days ago. Work is now progressing on the installation of No. 2 set.

Mexborough

The Yorkshire Electricity Board's No. 3 Subarea has announced that it is proposed to alter the voltage of supply in the urban districts of Mexborough and Conisbrough and the parishes of Old Denaby and Conisbrough Parks from 230 V single-phase to 240 V and 400 V 3-phase to 415 V. About 8,000 consumers will be affected.

North-Eastern

The quarterly report of the North-Eastern Electricity Board submitted to the Area Consultative Council at Newcastle-on-Tyne, stated that 80 new substations had been brought into operation in the area, and during the period 95 farms were connected. Villages supplied with energy included one in the Tyne area, two in the Tees area, six in the York area, and four in the Harrogate district. During the quarter the Board had approved estimates amounting to £705,170, covering schemes for 98 housing and 30 rural supplies. The present capital allocation for 1952-3 would allow stage 2 of the rural development scheme to be completed and supplies provided for nine more villages. In addition a start would be possible on the supplying of villages under stage 3 of the scheme. This included 28 villages in the Tyne area, two in the Wear area, three on Teesside, 10 in the York area, and 14 in the Harrogate area. During the past quarter, the Board has afforded high voltage supplies to 18 industrial and commercial consumers. The Board is making a start in the substitution of a Board's supply in villages at present supplied from networks owned by the National Coal Board.

LIGHTING SCHEMES

Ash (Surrey).—A Parish Council scheme for conversion of street lighting to electricity, at a total cost of £27,574 has been abandoned.

Dagenham.—T.C. to submit to M.o.T. for approval, plans for Stage 4 of the road lighting conversion scheme. Estimated cost £13,000.

Darlington.—T.C. has approved a revised estimate at £8,783 for the provision of sodium vapour lamps in Coniscliffe Road. A scheme for improving lighting in Haughton Road is being prepared.

Edmonton.—The B.C has revised its plan to spend £28,464 on converting 1911 street lamps from gas to electricity, to £5,680 for only 357 lamps.

Mitcham.—T.C. has been recommended to approve improved lighting, with sodium discharge lamps, in High Street, Colliers Wood (cost, £2,250); Western Road (£2,800); Christchurch Road (£1,550); Cranmer Road (£1,850); Madeira Road (£1,000); the Cricket Green (£1,050), and in Morden Road (£2.500).

Salford.—Ministry approval has been given to the Corporation's £15,000 street lighting plans. The scheme provides for replacing gas by electric lamps in Regent Road, Salford, and improved lighting and lamp standards in Eccles Old Road, Pendleton, and Leicester Road, Broughton.

Company Activities . . .

British Insulated Callender's Cables Ltd.

Group trading profit for 1951 is £7,966,464 compared with £6,130,642 for the previous year. There is again a final dividend of 5½% making 7½% (*same*), plus a bonus of 1½% (*nil*). To the trading profit is added investment income £122,278 (*£114,857*) profit on realisation of property and investments £29,517 (*£3,864*) and provisions no longer required £169,780 (*£57,664*), making a total of £8,288,039 (*£6,307,027*). Depreciation takes £845,836 (*£781,899*), interest £85,241 (*£85,501*), provisions £220,883 (*£185,279*) and taxation £4,081,211 (*£2,945,201*), leaving a net profit of £3,054,868 as against £2,309,147 for the previous year. Of that total £2,696,866 (*£2,070,438*) is attributable to the holding company, the Preference dividends absorb £59,588 (*£62,425*) and Ordinary distribution £436,608 (*£368,460*), and there is £257,349 (*£307,987*) carried forward. The recently issued 3,109,614 Ordinary shares of £1 each, offered at 22/- per share do not rank for the final dividend or the bonus. That issue, the directors have since announced, was considerably oversubscribed.

British Vacuum Cleaner & Engineering Co.

Group profit for the year to September 30 last, is £87,072 (*£65,355*), after charging taxation of £116,131 (*£57,880*). The Ordinary dividend is again 25%. The sum of £25,000 is placed to stock valuation contingency reserve and £10,000 to bad debts reserve.

Chloride Electrical Storage Co.

After deduction of profits attributable to outside shareholders of £13,647, allowing U.K. taxation of £1,573,173 (*£1,056,912*) and other taxation of £140,527 (*£70,919*), there is a balance of £1,386,272 (*£1,103,506*). There is a final dividend of 10% on "A" and "B" Ordinary stock, again making 15%.

Drayton Regulator Co. (Holdings)

Group profit for the year to December 31, 1951, after all charges including taxation, amounts to £71,475 (*£63,951*). U.K. taxation absorbs £92,536 (*£87,859*). Excess provision E.P.T., pension and life assurance scheme £3,961 (*nil*), to plant replacement reserve £20,000 (*nil*), and general reserve £26,650 (*nil*). The final Ordinary dividend is 20% making 30% (*both same*), and there is £65,144 (*£50,533*) carried forward.

Ever Ready Co. (Gt. Britain)

For the year to February 29 last the consolidated net profit is £364,584, as against £333,512 for the previous twelve months. This figure is struck after all charges, including taxation of £469,566 (*£362,083*), and also adding a capital profit of £5,221 (*£29,170*). The final Ordinary dividend is again 20%, maintaining a distribution of 35% for the year.

Glenfield and Kennedy

Consolidated net profit is £453,929 (*£399,970*), of which £7,740 (*£8,853*) is attributable to outside shareholders, and £68,506 (*£89,132*) retained by subsidiaries, leaving the net profit of the parent company at £377,683 (*£301,985*). There is a final Ordinary dividend of 10%, plus a special centenary bonus of 2½%, making 17½%

Hopkinsons Ltd.

For the year to January 31 last, the net profit, after all charges including taxation of £453,911 (*£418,319*) amounted to £345,380 (*£348,812*). The final Ordinary dividend is 20% (*17½%*), making a total of 27½% (*25%*).

Lancashire Dynamo Holdings

Group net profit for 1951, before taxation, is £481,082 (*£401,692*). After deducting tax of £277,925 (*£224,287*) and adding taxation provisions of previous year no longer required of £18,556, there is £221,713 (*£214,755*) available, of which the subsidiaries retain £52,263 (*£24,373*). The final dividend is 8½%, making 12½% for the year. For 1950 the distribution was an interim of 5%, and final 10%, plus bonus 7½% on half the present Ordinary capital.

C. A. Parsons & Co. Ltd.

This company also report a sharp rise in earnings for 1951. The trading profit is £2,223,952, as against £1,454,589 for 1950. There is a final dividend of 1s. 3d. per share (6¼%) on the Ordinary capital as increased by the 100% scrip bonus last October, which, with the interim of 1s. 6d. (7½%) on the old capital, makes a total of 2s. 9d. for the year. Taxation absorbs £1,156,500 (*£748,000*), leaving a net profit of £1,037,452 (*£656,589*), and there is £30,000 (*£50,000*) placed to contingencies.

Wm. Sanders & Co. (Wednesbury)

Net profit for 1951 is £34,164, subject to tax of £21,380. This compares with the directors' estimate of £39,042, which was made when the shares were introduced on the Birmingham Stock Exchange a year ago. The Ordinary dividend is 25%, as forecast.

Superheater Co., Ltd.

Profit for 1951 is £164,412 (*£178,509*) after charging taxation of £205,541 (*£201,912*). The final dividend on the Ordinary and 'A' Ordinary is 22½%, making 32½% for the year (compared with 15% on the smaller and 17½% on the larger capital for the previous year).

Dividend Declared

Rawlplug.—Final of 40% (*same*) plus bonus 5% (*nil*), making 55% (*50%*), net profit £221,286 (*£193,182*).

Commercial Information

CONTRACTS OPEN

HOME

April 25.—Belfast. Supply and erection of (*a*) road transport weighbridge (30 tons), tender No. N.1054; and (*b*) two sets of condensate chemical treatment plant for turbo-alternators, tender No. N.1174. Merz and McLellan, consulting engineers, Carliol House, Newcastle-on-Tyne 1. Deposit £5 5s. in each case. (See March 27 issue.)

April 26 —Gloucester. Electrical installation in new school at Lower Tuffley. Application by above date to City Architect, A. Morgan, Suffolk House, Greyfriars, Gloucester.

April 26.—Tandragee R.D.C. Wiring for electric light in 36 houses at Tullyhugh. D. W. Chambers, architect, Town Hall, Banbridge. Deposit £2 2s.

April 28.—Offaly. Complete electrical installation at vocational school, Banagher. Consulting engineer, J. V. Tierney, 15-16 Duke St., Dublin. Deposit £3 3s.

April 29.—Belfast. Installation of interior lighting scheme in City Hall. Documents from Smyth and Dorman, 31 College Gardens, Belfast.

April 29.—Hawick T.C. Electrical installation in erection of 20 houses at Burnfoot. Documents from Burgh Surveyor, Town Hall.

April 30.—Alnwick R.D.C. Electrical installation in 100 houses at Shilbottle. Applications by above date to Reavell and Cahill, Lloyds Bank Chambers, Alnwick.

April 30.—Angus. Supply and erection of 12 concrete columns and 26 pole brackets with lanterns, lamps, cabling. County Engineer, County Buildings, Forfar.

April 30.—Bournemouth T.C. Rewiring at Portchester secondary boys' school. Borough Architect, Town Hall. Deposit £1 1s.

April 30.—Invergordon T.C. Electrical work in connection with alterations to Alness public hall. J. S. Ross, Architect, Castle Brae, Tain.

April 30.—Maidstone T.C. Electrical installation in 108 houses under five contracts on Shepway estate. Borough Surveyor, Palace Avenue.

April 30.—N. Ireland. Supply and installation of dual programme radio system at Ratheane Hospital for N.I. Hospitals Authority. Secretary of Coleraine and Portrush Management Committee, Bann View Hospital, Coleraine.

April 30.—Wiltshire. Supply and installation of six new street lighting columns and removal and re-erection of three existing columns with control equipment and cables. County Surveyor, County Hall, Trowbridge. Deposit £2.

May 1.—Dublin. Revision and extension of electrical installations at Hospital 5, St. Kevin's Instn., and complete installation for new additions for Board of Assistance. Consulting Engineer, Nicholas Mathews, 42 Fitzwilliam Place, Dublin. Deposit £20.

May 2.—Laoighis. Supply and installation of one direct-driven electrically propelled pump for Stradbally sewerage scheme. Nicholas O'Dwyer, consulting engineer, 6 Burlington Rd., Dublin. Deposit £5 5s.

May 3.—Leigh T.C. Complete installation of (*a*) 2·24 miles of Group A mercury vapour lighting on concrete columns; (*b*) 0·24 miles of Group A fluorescent lighting on concrete columns; and (*c*) 0·6 miles of Group A mercury vapour lighting on trolleybus poles. Borough Engineer and Surveyor, Town Hall.

May 3.—Manchester. Supply of electric lamps required by Central Purchasing Committee. General Manager, Corpn. Transport Dept., 55 Piccadilly, Manchester

May 3.—Stretford T.C. Electrical installation in block of 22 flats on Moss Park (No. 2) site. A. H. Perry, Borough Surveyor, Town Hall. Deposit £2 2s. (Advertised in this issue.)

May 3.—Sunderland T.C. Electrical work in 360 houses on Farringdon estate. H. C. Bishop, Borough Architect, Stockton Rd.

May 5.—Basingstoke T.C. Supply and erection of system of three 140-W sodium lamps on concrete columns along Bypass. W. G. A. Clark, Borough Surveyor, Municipal Buildings. Deposit £2 2s. (Advertised in this issue.)

May 7.—Gateshead T.C. Electrical installation in new £90,000 offices for Borough Treasurer's Dept. on Shipcote site. H. J. Cook, chief architect, Municipal Buildings. Deposit £2 2s.

May 7.—Newcastle-on-Tyne. Electrical installation required for 252 flats being built on Slatyford Lane estate. City Architect, 18 Cloth Market, Newcastle.

May 8.—Leeds. Electric lighting installations in adaptations at 82 Cardigan Rd., Director of Works, Sweet St., Leeds 11.

May 10.—Glasgow. Transport Dept. requires supplies of v.i.r. and p.v.c. cables, electrodes and electric lamps. Applications to be included on list of contractors to General Manager, Transport Dept., 46 Bath St., Glasgow, by above date.

May 12.—Cockenzie and Port Seton T.C. Electrical work in erection of 32 houses on Old Golf Course site. James Gentles and Son, Chartered Quantity Surveyors, 18 Hanover St., Edinburgh.

May 12.—West Riding. Renewal of electrical installation (phase 1) at Thornton View, Clayton. County Architect, "Bishopgarth," Westfield Rd., Wakefield. Deposit £2 2s. (Advertised in this issue.)

May 14.—Wandsworth B.C. Installation of new electrically operated pump and other work at Putney Depot. Documents from Borough Engineer and Surveyor, Municipal Buildings, S.W.18.

June 6.—Belfast. Supply and erection of 33 kV and lower voltage cables for Victoria power station. Documents from Merz and McLellan, consulting engineers, Carliol House, Newcastle-on-Tyne. Deposit £5 5s. (Advertised in this issue.)

June 16.—Bristol. Supply of electrical stores for year ending June 30, 1953, for Cossham and Frenchay Hospital Management Committee. Secretary, Frenchay Hospital, Bristol.

No date stated.—Barrhead T.C. Electrical work in erection of 16 flats at Bourock Sq., 15 in Kelburn St., and 10 in Fereneze Ave. Names to Wm. Baillie and Son, Architects, 4 West Regent St., Glasgow C.2.

No date stated.—Bangor. Electrical work in 80 houses. Particulars from Charles Hutchinson Estates, Head offices, Ardmore Ave., Finaghy.

No date stated.—Lothians and Peebles. Electrical work in erection of 2 houses at Musselburgh. County Architect of Midlothian, 32 Palmerston Place, Edinburgh.

No date stated.—Sunderland T.C. Twelve months' supply of cookers required. Borough Engineer, J. E. Lewis, 27 Fawcett Street.

No date stated.—Trimdon (Dur.) P.C. Supply and installation of mercury vapour discharge units of 80 W type complete with 15 ft columns on Central housing estate. Particulars from Clerk, 9 Cleveland Ave., Trimdon.

OVERSEAS

*Details of items marked * may be obtained on application to the Board of Trade, Horseguards Avenue, S.W.1, quoting reference.*

May 6.—Columbia. Equipment and installation of new automatic telephone system for 15,000 subscribers in Barranquilla. Documents from the office of the Mayor (Oficina de Negocios Generales de la Alcaldia), Barranquilla, Columbia.

May 6.—South Africa. Supply of 20 kV cable and accessories: 17,388 ft (23 drums of 756 ft) of L.C.A. power cable and 22 L.C.A. joints. Optional requirement: 4,536 ft (6 drums of 756 ft) of same and 5 joints. Town Clerk, Municipal Offices, Johannesburg. B.o.T. (Ref: CRE 13899/52).*

May 12.—Uruguay. Usinas Electricas y Telefonos invite tenders for supply of equipment for eight transformer substations, including transformer units, connecting bars, switchgear, feeders, etc. B.o.T. (Ref. CRE 12612/52).*

May 13.—Uruguay. Supply of electrical equipment to make up western circuit (Montevideo-Mercedes) of national electric power network. Specifications from Usinas Electricas y los Telefonos del Estado, 100 pesos per copy.

May 16.—Uruguay. Supply of 890,000 metres of wire and 550,000 metres of cable to various specifications for Administracion General de las U.T.E., Paraguay 2431, Montevideo. B.o.T. (Ref. CRE 1261/52)*.

June 11.—Australia. Manufacture, supply maintenance, etc., of two 1,500 MVA step-down transformers for use on 66 kV 3-phase 50-c/s system at Theodore substation, for State Electricity Commission of Queensland. B.o.T. (Ref. CRE 13277/52).*

CONTRACTS PLACED

Eccles T.C. Improvement to lighting of Worsley and Barton Roads, N. Midland Engineering Co. (Skegby), £5,059.

Kerry. Lighting and heating in county clinic at Tralee, Clancy, £1,333.

Seaham (Dur.) U.D.C. Electrical work in 36 houses on Westlea estate. J. Calvert.

Hyde T.C. Electrical installation in 74 houses on Harbour Farm and Cheetham Fold estates, Johnson and Turner Ltd.

Winchester. Year's supply of electric lamps for Group Hospital Management Committee, Siemens Electric Lamps and Supplies, Ltd.

TRADE NOTES

Beama Contract Price Adjustment Formulae. *For Electrical Machinery and Equipment.* For purposes of calculating variations in: (a) "Rates of Pay"—the rate of pay for adult male labour at April 12, 1952, shall be deemed to be 134s. (b)"Cost of Material"—the index figure for materials used in the electrical machinery industry published in the Board of Trade Journal on April 12, 1952, is 165.4.

For Turbo-Generating and Allied Plant. For purposes of calculating variations in: (a) "Rates of Pay"—the rate of pay for adult male labour at April 12, 1952, shall be deemed to be 134s. (b) "Cost of Material"—the index figures published in the Board of Trade Journal on April 12, 1952, are: Materials used in mechanical engineering industries—152.2; blast furnaces and iron and steel melting and rolling (40 and 41)—142.6. The price of brass condenser tubes ¾ in. o/d, 18 s.w.g., published in the Metal Bulletin on April 18, 1952, is 3/7½d.

For Outstanding Contracts covered by the B.O.T. Intermediate Products Index. For purposes of calculating variations in: (a) "Rates of Pay"—the rate of pay for adult male labour at April 12, 1952, shall be deemed to be 134s. (b) "Cost of Material"—the index

Your Queries — Answered

"Apex" washing machines, agents for? W.S.—Home Electric Washer Co., 1 Craven Park, N.W.10. (22734)

"Raydyot" car heaters, makers of? M.E.—James Neale and Sons, Ltd., 68 Graham St., Birmingham 1. (22741)

"Transtar" lamp starter gear, makers of? M.C.—Inductive Appliances, Ltd., 18 Dean St., Newcastle-upon-Tyne. (22748)

"Light Trade" sewing machine motor, makers of? F.E.—Sewtric, Ltd., Spring House, Spring Place, N.W.5. (22756)

"Isofuse" fusegear, makers of? A.W. — Brookhirst Switchgear, Ltd., Northgate Works, Chester. (22763)

"Electrochurn" mixer, makers for? D.E.—Churn Co., Station Rd., Hailsham, Sussex. (22769)

Imitation food for display, suppliers of? N.E.—R. R. Thompson, Ltd., 38 Chestnut Grove, New Malden. (22775)

"Lectross" clothes dryers, suppliers of? E.B.—E.P.E., Ltd., 152 Fleet St., London, E.C.4. (22786)

The above are selected from questions we have answered this week. If you have a query, send it to us.

figure for intermediate products, published in the Board of Trade Journal on April 12, 1952, is 369.8.

Changes of address. The head office of Bennett, Fielding and Co., Ltd., is now at 30 Edward St., Blackpool.

Edward A. Pearce and Partners have closed their Harrow office, and are now established in larger premises at 28 Baker St., W.1. Tel.: Welbeck 3564.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	231 0 0	£220 0 0
LEAD, good soft pig (foreign)	163 0 0	152 0 0
" " " "English" quality ...	164 10 0	—
TIN (99-99.76%) ... ... (Cash)	962-963	—
" (3 months)	964-965	—
ALUMINIUM, commercial purity (del.)	154 0 0	—
ZINC	190 0 0	156 0 0
ARMOURING:		
Galv. Steel Wire (0·104 in.) ...	59 10 0	—
Mild Steel Tape (0·04 in.)	39 15 0	—

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

S. M. and R. Brace Ltd. Dairy Green, Thaxted, Essex. Manufacturers of and dealers in electric blankets, bedding, clothing, wearing apparel, etc. Nom. cap.: £100. Dirs.: S. M. Brace and Mrs. M. A. R. Brace.

British Tungsten Ltd. 11 Ironmonger Lane, E.C.2. Buyers, sellers, storers and distributors of tungsten and tungsten bearing ores and concentrates, etc., and to enter into arrangements with Derby and Co. Ltd., Metal Traders, Ltd., and H. A. Watson and Co. Ltd., etc. Nom. cap.: £150. Dirs.: N. Isaacs, E. Lunt and M. Murphy.

J. Cope Ltd. 199 City Rd., Cardiff. Telephonic engineers and contractors, electrical engineers, etc. Nom. cap.: £2,000. Dir.: J. I. J. Cope.

Ely Electrical Co., Ltd. 28a West End, Ely, Cambs. Electrical wholesale factors, etc. Nom. cap.: £5,000. Dirs.: J. E. Denley and Constance M. Denley.

J. Fennell (Coventry) Ltd. 158 Spon St., Coventry. To take over business of "J. Fennell" carried on at Coventry by Walter J. Fennell, dealers in electrical and mechanical apparatus and accessories, wireless sets, etc. Nom. cap.: £5,000. Dirs.: W. J. Fennell and Mrs. E. L. Fennell.

William Foster (Wigan) Ltd. Ince Green Lane, Ince, nr. Wigan. Wholesale factors in electric and domestic woodware products, etc. Nom. cap.: £5,000. Dirs.: W. Foster and D. B. Mentha.

Hawes Electric Ltd. The Hawes, Friends Lane, Gt. Sankey, nr. Warrington. Manufacturers of electric elements, heaters, thermostatic control switches, etc. Nom. cap.: £1,000. Dirs.: J. P. Suggitt, C. Cash, Mrs. A. Wilson and R. J. Cash.

L. Jones (Electrical) Ltd. Hepper House, East Parade, Leeds, 1. Wholesale dealers in and manufacturers of artificial lighting apparatus, electrical plant, wireless and television sets, etc. Nom. cap.: £10,000. Permt. mang. dir.: L. Jones.

Michael M. Kasriel Ltd. 101/3 Baker St., W.1. Civil, constructional, electrical, mechanical and general engineers, etc. Nom. cap.: £1,200. Dir.: M. M. Kasriel.

Kensal Electrics Ltd. 151 Kensal Rd., W.10. Electrical equipment specialists and manufacturers, etc. Nom. cap.: £500. Dirs.: J. H. Dale and Mrs. M. F. Dale.

Malmesbury Electronics Ltd., St. Michaels, Swindon Rd., Malmesbury, Wilts. Cap.: £3,000. Dirs.: H. L. Oura and Mrs. W. Oura.

Perrett and Couchman Ltd. 79 Mount Pleasant, Tunbridge Wells, Kent. Manufacturers of and dealers in wireless and television sets, artificial lighting apparatus, etc. Nom. cap.: £500. Dirs.: P. A. Perrett and H. S. Couchman.

Sir James Farmer Norton and Co. (Asia) Ltd. Mechanical and electrical engineers, etc. Nom. cap.: £1,000. Dirs.: D. E. Pepler Norton, D. G. Pepler Norton, C. Pepler Norton and W. C. Crockwell, address not stated. Subs.: G. W. Smith, 3 Mount St., Cowlersley, Huddersfield, and V. H. Sykes, 142 Blacker Rd., Birkby, Huddersfield.

Radio House (Macclesfield) Ltd. 62 Chestergate, Macclesfield. Manufacturers of and dealers in electrical batteries, lamps, radiators, electrical and wireless goods, etc. Nom. cap.: £1,500. Permt. dirs.: G. Parker and Edith Parker and J. Abraham.

Radio Services (Dorset) Ltd. 17a Christchurch Rd., Bournemouth. Manufacturers of and dealers in electrical and mechanical apparatus, wireless and television sets, etc. Nom. cap.: £5,000. Dirs.: D. R. Hills, J. U. Griffen and P. B. Reade.

M. A. Salter Ltd. Manufacturers of and dealers in electrical goods, wireless and television sets, etc. Cap.: £500. Permt. dirs.: M. A. Salter and D. B. Salter. Subs.: J. E. Binstock, 169 Gt. Portland St., W.1, and Betty Lanceman.

John Shewan and Son Ltd. 16/18 Burrow St., South Shields, Co. Durham. Merchants for the supply of builders', plumbers' and electricians' materials, etc. Nom. cap.: £3,000. Permt. dirs.: R. C. Shewan and Mrs. E. A. Shewan and N. Watson.

Reuben O. Tidball and Co. Ltd., 16 Park St., Tiverton, Devon. Plumbers, sanitary and heating engineers, electricians, etc. Cap.: £10,000. Dirs.: R. O. Tidball and F. W. Leaman.

Tonewood Products Ltd. 174 Commercial Rd., Stepney, E.1. Manufacturers and processors of and dealers in mechanical or chemical devices relating to radio, television and electronic products, etc. Nom. cap.: £100. Permt. dirs.: B. H. Lewis, J. Pachter and A. L. Rapp.

Totton Electrical Products Ltd., Windlo Works, Ringwood Rd., Totton. Cap. £3,000. Permt. dirs.: E. H. Triggs and W. J. Triggs.

Triggs and Widgery Ltd., Windlo Works, Ringwood Rd., Totton. Electrical engineers and contractors, etc. Cap.: £3,000. Dirs.: H. F. Widgery, E. H. Triggs and W. J. Triggs.

BUSINESS PROSPECTS

HOME

Barnstaple R.D.C. A further 38 houses to be built following recent additional allocation.

Bedfordshire. It is hoped to start soon on construction of proposed N. Beds. College of Further Education. Plans by S. V. Goodman, County Architect, Bedford.

Benfleet (Essex) U.D.C. Plans approved for 76 houses on Parkfields estate.

Billericay U.D.C. Fifty-four houses to be built on Vange site.

Bolton T.C. Additions and alterations are to be carried out at premises of A. J. B. Bradbury in Bridge St., John Twisse and Co., Ltd., in Twisse Rd., J. W. Marshall and Co., Ltd., at Springfield Paper Mills, and of De Havilland Propellers, Ltd., off Lostock Lane.

Bradford. City Council recommended to approve provision of additional overhead wiring from Town Hall Sq. to Bridge St., at estimated cost of £1,774.

Colchester T.C. Eighty-one houses to be erected on Monkwick estate.

Darlington. Some £300,000 is likely to be spent on conversion of Cleveland Ave. girls' school into a technical college.

Doncaster T.C. Construction of "Hawthorn" junior school at Cantley. Borough Architect, 15 South Parade.

Epping U.D.C. Erection of 32 houses on Beaconfield estate. Surveyor, 91 High Street.

Eston (Yorks) U.D.C. Shops and flats are to be built in Dalton Rd. Sites are being considered for erection of a total of 485 houses.

Falkirk. Dean of Guild Court has approved erection of extension to Parkhouse works for J. K. Millar, Ltd.

Filey U.D.C. Erection of 32 houses and 12 flats on Muston Rd. site. F. Vaux is architect, 31 Quay Rd., Bridlington.

Glasgow. Approval has been granted for adaptation of Royal Exchange Building to house Commercial and Stirling Libraries. Estimated cost, £30,200.

Hartlepool T.C. Construction of 36 flats in Lambton St., 54 in both Lambton St. and Hilda St., and 30 houses in Lynn St. Council is also considering erection of 113 houses in Hermit St. area. A. G. Sinclair is borough architect.

Huntingdonshire Approval granted for erection of parts of St. Ives (£85,000) and Ramsey (£72,000) secondary schools.

Huyton-with-Roby (Lancs) U.D.C. Permission being sought to erect 126 flats and 18 houses on St. John's Rd. East estate and 72 flats in Glenderon Road.

Leamington Spa T.C. Proposals have been approved for the provision of electric light in 252 houses at estimated cost of £8,000.

Leeds. Tenders expected to be invited for erection of 148 dwellings on the Tinshill, Ireland Wood, Seacroft and Moorfield estates.

Leyton T.C. Devine Bros. propose to extend their factory at 287 Cann Hall Road.

Loughborough T.C. Approval received for erection of 220 houses and 20 old persons' dwellings on Thorpe Acre estate.

Manchester. Applications will probably be made for sanction to borrow £88,710 for Brooklands primary school and extensions to Green End school, Burnage; £290,922 for 205 houses and flats at Blackley; £391,008 for 264 houses and flats on Chapel Lane estate; and £42,913 for 24 flats and four houses at Wythenshawe.

March U.D.C. Tenders expected to be invited shortly for erection of 54 bungalows. It is also proposed to build another 20 flats in district. Plans by Council Architect, W. S. Pickett.

Oldham T.C. Erection of 30 bungalows on Fitton Hill estate. Cameron and Middleton, chartered quantity surveyors, 21 Queen Street.

Peterborough. A new school estimated to cost £25,520 is to be built at Wittering during 1952-53.

Rotherham T.C. Erection of 125 houses on Kimberworth Park estate. E. J. Manson, Borough Engineer, Municipal Offices.

Rottingdean (Sussex). Construction of primary school in district. Architects, Hilton and J. M. Wright, 11 Campden Hill Rd., London W.8.

South Shields T.C. Erection of 320 houses on Simonside estate and 10 bungalows in Prince Edward Rd. J. Reid is borough engineer.

South Shields T.C. Construction of 174, 112 and 34 houses in three contracts on Simonside estate. Borough Engineer, Town Hall.

Sowerby Bridge U.D.C. Erection of 78 dwellings on Sowerby site. Architect and Surveyor to Council, "Beech Royd," Beech Rd.

Surbiton. Gattey (Engineering), Ltd., are proposing to extend their factory in Roebuck Road.

Surrey. Primary schools at Hinchley Wood (£30,500), Hook (£51,600) and Walton (£20,000) have been included in this year's building programme.

Wallington (Surrey). Precision Grinding, Ltd., propose to extend their factory in Mill Green Rd. Also Fell and Briant, Ltd., have submitted plans for rebuilding their Church Lane works.

Walsingham (Norfolk). R.D.C. Twenty-four houses are to be built on sites at Fakenham, Fulmodeston and Blakeney.

Weardale (Dur.) R.D.C. Approval granted for erection of 60 houses. Tenders will probably be invited shortly.

West Lothian. Thirty-two houses to be built at Dalmeny, 42 at Uphall, 16 at Livingstone Village, 40 at Fauldhouse and 22 at Blackburn.

Wigston (Leic) U.D.C. Thirty-five houses to be built in the district. Council's Architect, Council Offices.

Worcester. Recommendation is before council to apply for sanction to borrow £1,500 for electrical installation at Victoria Institute.

Workington T.C. Tenders will probably be invited shortly for erection of 90 houses on Westfield Drive estate.

OVERSEAS

Canada. Samuel S. Lerner, of 570 Queen St. E., Toronto, would like to obtain representation of U.K. manufacturer of a small portable electric drill for 110 V, 25 and 60 c/s, 3 to 5 lb capacity about ¼-in. drill.

Ceylon. S. S. Bartlett and Co., 35 Boswell Place, and 46 Maliban St., Colombo, wishes to

(continued on following page)

Business Prospects—continued

secure agencies for U.K. suppliers of a long list of commodities which includes domestic electrical goods and accessories and radios.

Canada. Just Equipment and Supply Co. Ltd., 173 Colborne St., Montreal, are interested in representing U.K. manufacturers of diesel engines (industrial, horizontal, medium or slow speed) between 5 h.p. and 1,500 h.p. construction equipment, generators suitable for diesel engine drive, and marine diesel engines up to 500 h.p. for industrial vessels.

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Electra Sales (Essex), Ltd. Creditors are requested to send particulars to Frederick Goodman, Cert. Acc., 3 Broad Street Bldgs., Liverpool St., E.C.2, liquidator, by May 7.

J. H. Payne (Birmingham) Ltd., electrical contractors. William Le' Resche Hand of Fletchers Chambers, Fore St., Birmingham 2, has been appointed liquidator with a committee of inspection.

Henray Electrical Co., Ltd. Meeting of creditors will take place at Berners Hotel, 10 Berners St., W.1, on April 30, at 11.30 a.m.

Companies Winding-up

Fairclough (Leeds), Ltd., electrical engineers, of Upper Mill Hill, Leeds. At first meeting of creditors Official Receiver reported that winding-up order was made on March 10. Statement of affairs showed liabilities of £950 against assets of £342. In addition to assets a director had estimated that there was some value in goodwill of business. No resolution was passed and matter was left in hands of Official Receiver as liquidator.

BANKRUPTCY ACTS

Release of Trustee

Scarborough. Kenneth R. Gregg, refrigeration manufacturer trading as Columbus Products (Scarborough) at Colleys Yard, Sherwood St. Trustee was James K. Snow, C.A., Alma Chambers, Scarborough.

Receiving Order

Chester. John V. Barke, electrical engineer of 21 Circular Drive, Chester. Date of receiving order, Feb. 28.

MEETINGS TO NOTE

THURSDAY, APRIL 24

I.E.S. (Bradford Group).—"Hospital Lighting." J. K. Frisby. Y.E.B., Sunbridge Rd., 7.30 p.m.

I.E.E. (London). — Forty - third Kelvin Lecture on "Iron Atoms in Service of the Electrical Engineer." Sir Charles Goodeve. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (N.E. Scotland Sub-centre). —Faraday Lecture on "Sound Recording—Home, Professional, Industrial and Scientific Applications." G. F. Dutton. Music Hall, Aberdeen.

S. WALES INST. OF ENGINEERS.—"Contact Welding." D. Young (Philips Electrical). The Institute, Park Place, Cardiff, 6 p.m.

FRIDAY, APRIL 25

INSTN. OF MECHANICAL ENGRS.—"Cause, Effect and Possible Remedy of Explosions in enclosed Crankcases of Steam and Internal Combustion Engines." John Lamb. Storey's Gate, S.W.1, 5.30 p.m.

E.P.E.A. (S. Meters Engrs' Technical Group).—Annual dinner at Palmerston Restaurant (Bishopsgate), 6 p.m.

I.E.E. (London Education Circle). —Discussion on "Teaching of Transients and Use of Operational Methods." Instr.-Cdr. D. K. McCleery, R.N., and H. Tropper. Savoy Place, W.C.2, 6 p.m.

MONDAY, APRIL 28

I.E.S. (Leeds Centre).—Annual meeting and address by vice-president of I.E.S. Lighting Service Bureau, Aire St., 7 p.m.

I.E.E. (London Radio Section).—Convention on "British Contribution to Television."

I.E.E. (S. Midland Radio Group). —"Radar Sonde." F. E. Jones. James Watt Inst., Birmingham, 6 p.m.

A.S.E.E. (N.W. London Branch). Brains Trust at Prince of Wales Hotel, Kingsbury Rd., 7.45 p.m.

EXHIBITION on "Development in 'Celanese' Plastics" organised by British Celanese, Ltd., at Celanese House, Hanover Sq., W.1. Open until May 16.

TUESDAY, APRIL 29

SOC. OF RELAY ENGRS.—Annual meeting. "Cable for TV Relay Systems." H. J. Dixon. Mt. Hinchliffe. 21 Bloomsbury St., W.C.1, 2.30 p.m.

SOC. OF INSTRUMENT TECHNOLOGY. —"Why the Human Operator?" Dr. W. E. Hick. Royal Soc. of Tropical Medicine, Portland Place, 6.30 p.m.

INST. OF HEATING AND VENTILATING ENGRS. (Scottish Branch).—"Review of Current Research in Heating and Ventilating." N. S. Billington. 351 Sauchiehall St., Glasgow, 6.30 p.m.

INST. OF PRODUCTION ENGRS. (Luton Section).—"Electric Welding in General Engineering." R. T. Rolfe and A. Holmes. H. Allen, Sons and Co., Ltd., Bedford, 7.15 p.m.

WEDNESDAY, APRIL 30

BRITISH INSTN. OF RADIO ENGRS. (N.W. Section).—"V.H.F. Broadcasting: Case for Amplitude Modulation." J. R. Brinkley. College of Technology, Manchester, 7.15 p.m.

THURSDAY, MAY 1

INST. OF FUEL.—"Railways and Coal." R. G. Jarvis. Inst. of Mechanical Engrs., Storey's Gate, S.W.1, 5.30 p.m.

FRIDAY, MAY 2

INST. OF MECHANICAL ENGRS.—"Control and Recovery of Dust and Fume in Industry." Robert Ashman. Storey's Gate, S.W.1, 5.30 p.m.

A.S.E.E. (Nottingham Branch). Programme of electrical films at Electricity Showrooms, Smithy Row, 7.30 p.m.

A.S.E.E. (Liverpool Branch). Lecturettes at Liverpool Engineering Soc., 24 Dale St., 8 p.m.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller

Durite. 704,228. Class 9. Electrical apparatus and instruments, etc. Gordon Equipments Ltd., 161 Queen's Rd., Buckhurst Hill, Essex.

Emitrade. 705,252. Class 9. Electric scientific instruments and apparatus; and instruments and apparatus for recording, reproducing, receiving and transmitting sound, etc. Electric and Musical Industries, Ltd., Blyth Rd., Hayes, Middx.

Enfo. 699,685. Class 11. Lamps, lamp glasses, etc. Ford Motor Co. Ltd., 88 Regent St., W.1.

Flica. 705,009. Class 11. Installations for refrigerating. John Kimbell and Co., Ltd., 146 Grosvenor Rd., S.W.1.

Histokinette. 705,073. Class 9. Electrical apparatus and instruments, etc. Hendrey Relays Ltd., 392, Bath Rd., Cippenham, Slough, Bucks.

Lumilux, 705,136, and **Unicon,** 705,136. Class 11. Lighting installations, etc. Holophane, Ltd., Holophane House, Elverton St., S.W.1.

Verigraph. 687,593. Class 16. Recording charts for use in connection with apparatus for controlling the moisture content of paper. Foxboro-Yoxall, Ltd., Lombard Rd., Morden Rd., S.W.19.

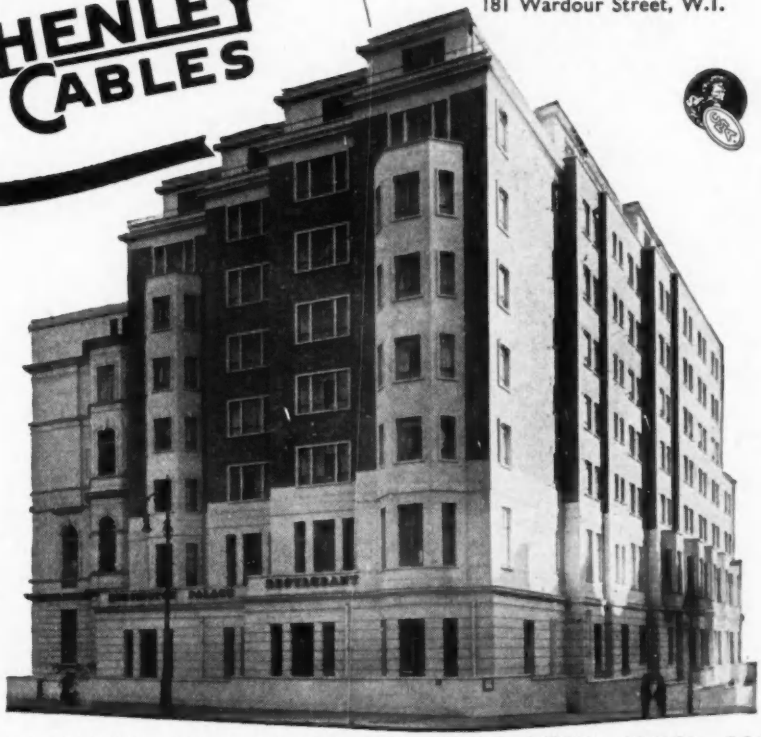
London's largest new hotel

The 'Kensington Palace' is the largest hotel to be opened in London for eighteen years, and was built in seven months by Sir Robt. McAlpine & Sons Ltd. Overlooking Kensington Gardens, the hotel adjoins Kensington Palace Mansions, the buildings being intercommunicating. Bedroom accommodation totals 250, with capacity for 420 visitors.

Electrical Engineers :
TROUGHTON & YOUNG LTD.
Knightsbridge, S.W.3.

Architects :
DUKE & SIMPSON, LL.R.I.B.A.,
181 Wardour Street, W.1.

wired throughout with
HENLEY
CABLES



BY APPOINTMENT
ELECTRIC CABLE
MANUFACTURERS

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53, HATTON GARDEN, LONDON, E.C.1.

WESTON
Electrical Measuring Instruments

No. 8 Miniature Portable Instruments

Although measuring only 4·4″ x 4·6″ x 1·8″, the model S.61 (available in D.C. moving coil, A.C. rectifier and H.F. thermocouple types), has first grade accuracy and in addition to applications where portability is the first consideration, its robustness renders it suitable for many uses in industry, field measurements, educational institutes etc. Scale length is 2·6″ and the instrument is magnetically shielded and fitted with spring loaded jewels for shock protection. Full details of the S.61 illustrated above will gladly be supplied on request. The full Weston range includes panel, switchboard, portable, sub-standard and laboratory standard instruments.

SANGAMO WESTON LIMITED

Enfield, Middlesex. Tel: Enfield 3434 (6 lines) & 1242 (4 lines) Grams: Sanwest, Enfield

Branches: Glasgow, Manchester, Newcastle-on-Tyne, Leeds, Liverpool, Wolverhampton, Nottingham, Bristol, Southampton, Brighton

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

BOROUGH OF BASINGSTOKE

GROUP "A" STREET LIGHTING
BASINGSTOKE BY-PASS

TENDERS are invited for the SUPPLY, ERECTION and putting into service of a system of 3 140-W SODIUM DISCHARGE LAMPS ON REINFORCED CONCRETE COLUMNS.

Specification and form of tender may be obtained from Mr. W. G. A. Clark, B.Sc., A.M.I.C.E., A.R.I.C.S., Borough Surveyor, Municipal Buildings, Basingstoke. Applications must be accompanied by a deposit of 2 gns. (cheques to be made payable to Basingstoke Corporation), which will be refunded on receipt of a bona-fide tender upon the prescribed form.

The Council do not bind themselves to accept the lowest or any tender.

Tenders, in a sealed envelope endorsed "By-Pass Lighting," must be delivered to the undersigned not later than Monday, May 5, 1952.

MEIRION O. JONES,
Town Clerk.

Municipal Buildings,
Basingstoke. (S 155)

BOROUGH OF STRETFORD

MOSS PARK (No. 2) HOUSING SITE
ELECTRICAL INSTALLATION TO FLATS

THE TOWN COUNCIL invites TENDERS for the provision complete of ELECTRICAL INSTALLATIONS in one block of 22 single-bedroom flats with common room on the Moss Park (No. 2) Housing Site, Stretford.

The specification, form of tender and other particulars may be obtained on application to Mr. A. H. Perry, Borough Surveyor, any day during office hours on payment of a deposit of 2 guineas, which will be returned on receipt of a bona-fide tender.

Tenders are due at the Town Hall by first post on Saturday, May 3, 1952, and must be forwarded in the special envelope provided, sealed and addressed to the undersigned, endorsed "Tender for Electrical Installation," and such envelope shall not bear any name or mark indicating the sender.

The lowest or any tender will not necessarily be accepted.

C. TREWAVAS,
Town Clerk.

Town Hall,
Stretford.
April 15, 1952. (S 156)

COUNTY COUNCIL OF THE WEST RIDING OF YORKSHIRE

Health Committee

TENDERS are invited for the RENEWAL OF THE ELECTRICAL INSTALLATION (Phase 1) at Thornton View, Clayton, Bradford.

Specification with plan, together with conditions of tender, may be obtained on application to the County Architect, "Bishopgarth," Westfield Road, Wakefield, on payment of a deposit of £2 2s., which will be returned on receipt of a bona fide tender. Cheques must be made payable to the "West Riding Treasurer" and crossed "& Co."

Sealed tenders must be addressed to me, the undersigned, and received at Room 4, County Hall, Wakefield, not later than 10 a.m. on Monday, May 12, 1952.

BERNARD KENYON,
Clerk of the County Council.

April, 1952. (S 183)

CITY OF BELFAST

Electricity Department

CABLES, VICTORIA POWER STATION

TENDERS are invited for the SUPPLY, DELIVERY and ERECTION of 33 kV and lower voltage cables.

Form of tender (No. N.1169), conditions and specification, in quintuplicate, may be obtained from Messrs. Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-upon-Tyne 1, on payment of a deposit of five guineas. This deposit will be refunded provided a bona fide tender is lodged and not withdrawn. Extra copies of the contract documents may be obtained at one guinea per set; this sum will not be returnable. Cheques should be made payable to the Belfast Corporation Electricity Department.

Each tender, in quadruplicate, in sealed envelope marked "Tender for 33 kV and Lower Voltage Cables, Electricity Committee," and endorsed with the name and address of the tenderer, must reach the undersigned not later than 4 p.m. on Friday, June 6, 1952.

An official receipt must be obtained for each tender delivered by hand. Tenders sent by post should be registered.

The lowest or any tender will not necessarily be accepted.

JOHN DUNLOP,
Town Clerk.

City Hall, Belfast.
April 17, 1952. (S 185)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

CROWN AGENTS FOR THE COLONIES

TECHNICIAN required by the Government of Northern Rhodesia in Posts and Telegraphs Department for one tour of three years in first instance with prospect of permanency. Commencing salary according to age and experience in scale £583, rising to £999 a year (including cost-of-living allowance). Free passages. Liberal leave on full salary. Candidates between 25 and 35 must have served a full apprenticeship with a well-established manufacturer of petrol-diesel stationary engine-alternator equipment and be competent to undertake the running maintenance of petrol and diesel-driven a.c. plant with associated switchboards, also workshop major overhauls of both types of engines up to 30 h.p. They should also have a working knowledge of the operation of low-powered (500 watts output) H.F.C.W. radio transmitters and receivers. Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience and mentioning this paper to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting on letter M.29288.B. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (S 123)

BRITISH ELECTRICITY AUTHORITY

North Western Division

STATION SHIFT CONTROL ENGINEER required at Westwood Generating Station, Wigan, Lancs. Salary, £588 to £810 (N.J.B. G10). Apply to Establishments Officer, British Electricity House, 825 Wilmslow Road, Manchester 20, before May 3. Quote Vacancy No. 710. (S 161)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts. N.J.B. conditions of service. Salaries inclusive of London Allowance.

BOILER HOUSE SUPERINTENDENT
Fulham Generating Station

Qualifications: Sound mechanical and electrical training with first-class technical background. Wide experience necessary in efficient operation and maintenance of large modern operating plant and auxiliary equipment. Ability to plan and organise work to strict time schedule. Experience in power station's labour relations policy, modern concept of management essential. Salary, Schedule "A," Class "L," Grade 6, £1,020 12s. p.a.

GROUP IV EFFICIENCY AND TESTING ENGINEER

Qualifications: Degree in engineering or requisite technical qualifications for Corporate Membership I.Mech.E. or I.E.E. Experience in carrying out tests on steam and mechanical plant and heat exchange apparatus, also capable of preparing reports and interpreting results. Salary, Schedule "C," Class "AX/EX," Grade 2, £849 9s. to £1,108 p.a.

SENIOR DRAUGHTSMEN (ELEC.)
Divisional H.Q.

Experience in preparation of drawings in connection with main and auxiliary switchgear, transformers, cables, etc., and heavy plant layouts associated with large power stations. Qualifications: Practical training at manufacturers' works and familiarity with general design, assembly and installation of this plant. Technical training up to Higher Nat. Cert. in Elec. Engineering. Salary: Schedule "D," Grade 4, £683 11s. to £792 15s.; Grade 5, £574 7s. to £683 11s. p.a.

SENIOR DRAUGHTSMEN (MECH. ENGINEERING)
Divisional H.Q.

Experience in preparation of drawings required for detailed development and ordering of mechanical plant, piping connections, etc., associated with complete large power stations. Qualifications: Practical training at manufacturers' works and familiarity with general design, assembly and installation of such plant. Technical training up to Nat. Cert. in Mech. Engineering. Salary, Schedule "D," Grade 4, £683 11s. to £792 15s.; Grade 5, £574 7s. to £683 11s. p.a.

SENIOR DRAUGHTSMEN (CIVIL ENGINEERING AND BUILDING)
Divisional H.Q.

Experience in preparation of working drawings associated with design of large power stations, covering reinforced concrete, heavy structural steelwork and/or building work. Technical training up to Nat. Cert. and practical experience either at a works on or site would be considered an advantage. Salary, Schedule "D," Grade 4, £683 11s. to £792 15s.; Grade 5, £574 7s. to £683 11s. p.a.

Applications, stating age, qualifications and experience, to the Divisional Secretary, B.E.A. London Division, Ergon House, Horseferry Road, S.W.1, within fourteen days of the appearance of this advertisement.

H. V. PUGH,
Divisional Controller.
(S 160)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

ASSISTANT SHIFT CHARGE ENGINEER required at Ocker Hill Generating Station, Staffs. N.J.B. service conditions, superannuable appointment, salary within Schedule "A," Grade "F9," commencing at £587 per annum.

Ordinary National Certificate in mechanical engineering or equivalent qualification required, together with sound technical training and practical experience in power station operation.

Application forms available from the Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, to be returned, completed, by May 10, 1952.

F. W. LAWTON,
Divisional Controller.
(S 158)

MIDLANDS ELECTRICITY BOARD

THIRD ASSISTANT DISTRICT ENGINEER required in the Stratford-upon-Avon District, Worcester and District Sub-Area. Experience necessary in all branches of distribution work, including operation and maintenance of high and low voltage cable, etc. Experience in d.c./a.c. changeover an advantage. Technical qualifications desirable. Salary £512 (N.J.B. Class "C," Grade 9): superannuable.

Apply within 14 days, stating age, experience, salary and position, to Mr. R. Mallet, Sub-Area Manager, Midlands Electricity Board, Whittington, Worcester.

A. STEPHENS,
Secretary.
(S 182)

CROWN AGENTS FOR THE COLONIES

SHIFT CHARGE ENGINEER required for Central Electrification Scheme in Cyprus for 2 tours, each of 2 years, in first instance, with option of receiving gratuity on satisfactory completion of final service at the rate of £25 for each period of 3 months or becoming a contributor to a superannuation fund. Salary according to age and experience in scale £858 rising to £990 a year (including cost-of-living allowance). Free quarters and passages. Liberal leave on full salary. Candidates, under 45 years, must have served an apprenticeship to mechanical engineering and have had considerable experience in the operation of a modern generating station. Preference will be given to candidates who are corporate or graduate members of the Institution of Electrical Engineers and/or the Institution of Mechanical Engineers, or who hold equivalent qualifications.

Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting on letter M.28674.B. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (S 159)

SOUTH WALES ELECTRICITY BOARD

West Central Sub-Area

APPOINTMENT OF LINESMEN, CABLE JOINTERS AND RIGGERS

APPLICATIONS are invited from Linesmen (Overhead Power), Cable Jointers, and Riggers (Grade I) to fill vacancies in the West Central Sub-Area Construction Department, Pontardulais, nr. Swansea.

Rates of pay and conditions of service in accordance with National Joint Industrial Council Agreement for Electricity Supply Industry, i.e. 3/1¼, 3/2½ and 3/4½ per hour respectively for a 44-hour, 5-day week.

Applications, stating age, details of training and experience in present and previous positions, to be addressed to the Manager, Ministry of Labour and National Service, Employment Exchange, Dulais Road, Pontardulais, nr. Swansea, to reach him not later than Monday, May 5, 1952.

G. R. T. EDWARDS,
Sub-Area Manager.

Ystrad Road,
Fforestfach, Swansea.
April 18, 1952. (S 157)

LONDON ELECTRICITY BOARD

INSTALLATION SUPERVISOR

APPLICATIONS are invited for the above position in the Commercial Department, Hackney District of the Northern Sub-Area.

Candidates should possess sound technical knowledge and be experienced in all types of wiring installations and consumers' apparatus. The successful applicant will be required to prepare specifications, estimates and tenders for all classes of electrical installations, and to supervise contracting work in progress.

Pending grading of the post under the national agreement of the appropriate negotiating body, the provisional salary will be fixed according to qualifications and experience, up to a maximum of £650 per annum inclusive.

Application forms, obtainable from the Establishments Officer, 46 New Broad Street, E.C.2, to be returned completed by May 3, 1952. Please enclose addressed foolscap envelope and quote Ref. V/1441/T. (S 146)

NORTH EASTERN ELECTRICITY BOARD

York Sub-Area

APPLICATIONS are invited for the appointment of SECOND ASSISTANT ENGINEER (Operation and Maintenance), at Sub-Area Headquarters. Applicants should be qualified electrical engineers with considerable experience of operation and maintenance of h.v. and l.v. systems. Experience of the installation and testing of protective gear and plant will be considered advantageous.

Salary (Schedule "A," Class "G," Grade 7, £704 to £733) and conditions of service in accordance with N.J.B. Agreement.

Applications, stating age, qualifications and experience, should be forwarded to the Secretary (Establishments), The North Eastern Electricity Board, Carliol House, Newcastle-upon-Tyne 1, within 10 days of the appearance of this advertisement. (S 162)

APPLICATIONS are invited for the post of CHARGE ENGINEER in a large modern power station near London. Applicants, whose age should not be less than 35 years, must have had considerable experience in the efficient operation of large pulverised fuel-fired boilers, modern turbo-alternators, and e.h.t. systems and distribution. Non-contributory pension scheme. Commencing salary £840 p.a.—Reply to Box No. 1665, Electrical Times, quoting ref. CE. (S 103)

COUNTY BOROUGH OF CROYDON

Education Committee

CROYDON POLYTECHNIC

Principal: HUGH A. WARREN, M.Sc.(Eng.), A.M.I.C.E., M.I.Struct.E.

APPLICATIONS are invited for an appointment in the Electrical Engineering Department of a full-time ASSISTANT LECTURER (Grade A) with specialist knowledge of Radio Engineering. Applicants should hold a degree in Electrical Engineering or an equivalent qualification, and have had satisfactory industrial experience in light current and radio engineering. Previous teaching experience in either a full-time or part-time capacity will be an added qualification.

Salary will be Burnham Technical Scale, Grade "A" (London Area). Duties to commence in September, 1952.

Further particulars and forms of application may be obtained (on receipt of a stamped addressed envelope) from the undersigned, to whom completed forms must be returned within two weeks of the date of this advertisement.

Note: The Committee are unable to provide housing accommodation.

HERBERT ROBERTS
Chief Education Officer.

Education Office,
Katharine Street,
Croydon, Surrey. (S 187)

(A) SHIFT ENGINEERS are required for a large sea-water distillation plant and power station now being built for the Government of Kuwait in the Persian Gulf. In the first instance, the distillation plant will be capable of distilling one million gallons of water per day from sea water and the power station will have a total capacity of 30,000 kW. For men of experience, a starting consolidated salary of £1,600 per annum is offered to suitable applicants. This may be varied according to experience. Applicants should have had at least three years experience in a similar position.

(B) ASSISTANT ELECTRICAL MAINTENANCE ENGINEER is required for a large sea-water distillation plant and power station now being built for the Government of Kuwait in the Persian Gulf. In the first instance, the distillation plant will be capable of distilling one million gallons of water per day from seawater, and the power station will have a total capacity of 30,000 kW. For men of experience, a starting consolidated salary of £1,500 per annum is offered to suitable applicants. This may be varied according to experience. Applicants should have had at least three years experience in a similar position.

(C) QUALIFIED POWER STATION CHEMIST is required for a large seawater distillation plant and power station now being built for the Government of Kuwait in the Persian Gulf. In the first instance, the distillation plant will be capable of distilling one million gallons of water per day from seawater, and the power station will have a total capacity of 30,000 kW. For men of experience, a starting consolidated salary of £1,500 per annum is offered to suitable applicants. This may be varied according to experience. Applicants should have had at least three years experience in a similar position.

Free furnished accommodation, when available, will be provided in addition to the salary, but State employees are required to pay for their own messing and servants. In the first instance the term of service will be one year and, if satisfactory, the contract may be extended a further two years. The rate of leave for the last two years will be 60 days per year of service.

Applications, in writing, giving full particulars of training, qualifications and experience, should be addressed in the first instance to The Secretary, Ewbank and Partners, Ltd., Engineering Consultants, 10/11 Grosvenor Place, London S.W.1. (S 167)

APPLICATIONS are invited from ENGINEERS preferably aged 23 to 28 years who have served a recognised apprenticeship with an electrical or mechanical engineering manufacturer and hold a Higher National Certificate or equivalent for progressive appointments in the standards and specifications department, Stafford. This department is concerned with the specifying and codifying of techniques, processes and materials used in the whole range of the company's manufactures. Permanent positions and pension scheme.—Write, stating age, qualifications and experience quoting reference 947A to Central Personnel Services, English Electric Company, Ltd., 24-30 Gillingham Street, London, S.W.1. (S 138)

BRITISH ELECTRICITY AUTHORITY require RESIDENT TUTOR at the Authority's education centre, Electricity Hall, Buxton, Derbyshire.

The successful applicant will be responsible to the Education and Training Officer for organising educational courses for all grades of employee in accordance with programmes determined by the Electricity Boards, and will be required to undertake some lecturing.

Applicants should possess educational qualifications in engineering or economics, with some teaching experience and preferably a knowledge of the electricity supply industry.

Salary, £845 to £950 (N.J.C. Grade 8). Pension scheme.

Apply by May 10, giving age and detailed experience, to D. Moffat, Director of Establishments, British Electricity House, Great Portland Street, London W.1. Quote Reference AE/242. (S 172)

BRITISH ELECTRICITY AUTHORITY require two SECOND ASSISTANT ENGINEERS in the Co-ordination Sub-Branch of the Generation Construction Sub-Department at Headquarters in London.

Those appointed will assist in the co-ordination of construction work at a group of power stations, and may be required to attend site meetings and to visit power stations in various parts of the country.

Candidates should be Associate Members of the I.Mech.E. or I.E.E. or have equivalent qualifications, and have practical experience in the construction of modern power stations, including handling of contracts, preparation of commissioning programmes, work on site and co-ordination of work from inception to commissioning. Salary within N.J.B. Grade 3 (£814 to £1,081, rising to £1,184 including London Allowance). Pension scheme.

Apply, stating age, qualifications, experience, present position and salary to D. Moffat, Director of Establishments, British Electricity House, 170 Great Portland Street, W.1, by May 10, 1952. Quote reference No. AE/243 (S 173)

CABLE manufacturers, London area, require a CHEMIST with experience of enamelled wire manufacture, using both oleo-resinous and synthetic enamels. Our staff have been informed of this advertisement.—Reply, stating age, and details of qualifications and experience, to Box No. 1667, Electrical Times. (S 105)

CONSULTING Engineers in the north of England require MECHANICAL and ELECTRICAL DRAUGHTSMEN and JUNIOR ENGINEERS, having some knowledge of design and layout of large electricity generating stations. Application should be made not later than May 10 to Box No. 1677, Electrical Times. (S 170)

COSTING AND SALES CLERK wanted for West End contractors.—Write, stating age and salary required, Box No. 1675, Electrical Times. (S 148)

DEPUTY PLANT SUPERINTENDENT required for a large sea water distillation plant and power station, now being built for the Government of Kuwait in the Persian Gulf. In the first instance, the distillation plant will be capable of distilling one million gallons of water per day from sea water and the power station will have a total capacity of 30,000 kW. Applicants should have held a similar position for at least three years. Preference will be given to applicants who have some knowledge of chemistry and they should be trained either as mechanical or electrical engineers. The term of service in Kuwait will be, in the first instance, two summers, after which leave at the rate of 60 days per annum will be allowed on full salary. When available, free furnished accommodation will be provided in addition to the salary, but employees are required to pay for their own messing and servants. Applications, in writing, giving full particulars of training, qualifications and experience, should be addressed in the first instance to the Secretary, Ewbank and Partners, Ltd., Engineering Consultants, 10-11, Grosvenor Place, London S.W.1. (S 166)

ELECTRICAL DESIGNER-DRAUGHTSMAN required for consulting engineers office. Must be experienced in the layout and design of installations covering factories, hospitals, schools, etc.—Apply, giving details of training and experience to: Hoare, Lea and Partners, 32 Deansgate, Manchester 3. (S 120)

ELECTRICAL PROTECTION ENGINEER, aged 27 to 35, to carry out all protection testing and fault location and to run electrical instrument repair and calibration workshop, required for Middle East. Grad. Inst. E.E. and familiar with full Power Station and transmission protective schemes. Substantial salary and allowances; pensionable; paid Home Leave at two-yearly intervals. No married accommodation for first tour.—Write quoting No. 192 to Box 5786, c/o Charles Barker and Sons Ltd., 31 Budge Row, London, E.C.4. (S 184)

EWBANK AND PARTNERS LTD., have vacancies for the following:—

ELECTRICAL ENGINEERING DRAUGHTSMEN experienced in power station and sub-station distribution systems.

MECHANICAL ENGINEERING DRAUGHTSMEN experienced in power station design and layout, pipework layout, circulating water systems or coal and ash handling plants.

TRACERS (FEMALE) experienced in power station and general engineering work.

The positions are permanent and are pensionable. Free lunches are provided and a five-day week is in operation. —Applicants should write in first instance, stating age, details of experience and salary required, to: The Secretary, Ewbank and Partners Ltd., Engineering Consultants, 10/11 Grosvenor Place, S.W.1. (S 115)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

ENGINEER, technically qualified and experienced in the design and manufacture of supertension cable, required for permanent senior appointment.—Applications, which should be fully detailed and marked "Engineer," will be treated in strict confidence. Aberdare Cables, Ltd., Aberdare, Glam. (S 67)

FERRANTI LTD., Transformer Department, has a vacancy for a METHODS ENGINEER for production development work on power transformers. Previous experience in the manufacture of transformers is desirable but the first essential is a good mechanical engineering background. This would be a permanent staff appointment with pension benefits.—Forms of application from Mr. R. J. Hebbert, Staff Manager, Ferranti Ltd., Hollinwood, Lancs. Please quote reference TME. (S 165)

GRADUATE ELECTRICAL ENGINEER for electrical laboratory work associated with cable development. Previous experience not essential. Salary according to experience and qualifications.—Applications, in writing, to the Staff Officer, British Insulated Callender's Cables Ltd., Prescot, Lancs. (S 168)

IMPERIAL CHEMICAL INDUSTRIES LIMITED, General Chemicals Division, have the following vacancies:—

SENIOR ASSISTANT ENGINEER (GENERATION). P/1. Applications are invited for the position of additional Senior Assistant Engineer in the Generation Section of the Company's Power Department, Runcorn, Cheshire. The duties are to assist, under the direction of the Generation Section Manager in the headquarters of the Department, with the operation and maintenance of the Division's power stations and with the design of extensions thereto. Applicants, who should be between the ages of 30 and 38 years, and should hold a Degree in Mechanical or Electrical Engineering, must have had a sound mechanical engineering training and should have had considerable experience of the operation and maintenance of large modern high pressure steam power stations. In addition, they should have had some experience of the preparation of designs and specifications for new plant and of investigations and tests in connection therewith, while Corporate Membership of either the Institution of Mechanical Engineers or the Institution of Electrical Engineers is also desirable. The selected candidate will be required to pass a medical examination and to join the Company's Pension Fund.

SENIOR ASSISTANT ENGINEER (MECHANICAL). P/2. Applications are invited for the position of additional Senior Assistant Engineer in the Mechanical Section of the Company's Power Department, Runcorn Cheshire. The duties are to assist, under the direction of the Mechanical Section Manager in the headquarters of the Department, with the maintenance of the mechanical equipment of the Division's power stations and with the design of extensions thereto. Applicants, who should be between the ages of 30 and 38 years, and should hold a Degree in Mechanical Engineering, must have had a sound mechanical engineering training and should have had considerable experience of the maintenance and design of the mechanical equipment of large modern steam power stations. In addition, they should have had some experience of the preparation of designs and specifications for new plant and investigations and tests in connection therewith, while Corporate Membership of the Institution of Mechanical Engineers is also desirable. The selected candidate will be required to pass a medical examination and to join the Company's Pension Fund.

ASSISTANT ENGINEER (GENERATION). P/3. Applications are invited for the position of Assistant Engineer in the Generation Section of the Company's Power Department, Runcorn, Cheshire. The duties are to assist, under the direction of the General Section Manager, in the headquarters of the Department, with the operation and maintenance of the Division's power stations and with the design of extensions thereto. Applicants, who should be between the ages of 28 and 35 years, and should hold a Degree in Mechanical or Electrical Engineering or a Higher National Certificate in Mechanical or Electrical Engineering, must have had a sound mechanical training and good experience of the operation and maintenance of modern high pressure steam power stations. In addition, they should have had some experience in the preparation of designs and specifications for new plant and investigations and tests in connection therewith, while membership of the Institution of Mechanical Engineers or the Institution of Electrical Engineers is also desirable. The selected candidate will be required to pass a medical examination and to join the Company's Pension Fund.

Applications in writing, giving age and full particulars of education technical qualifications, engineering training and power station experience, should be sent to The Staff Manager, Imperial Chemical Industries Limited, General Chemicals Division, Cunard Building, Liverpool, 3, quoting reference P/1, P/2 or P/3 as appropriate. (S 118)

IMPERIAL CHEMICAL INDUSTRIES LTD., General Chemicals Division, Cunard Building, Liverpool 3, invite applications for the position of SHIFT CONTROL ENGINEER in the company's power department for control room duties at West Bank Power Station, Widnes. Applicants, who should be between the ages of 25 and 30 years, should have had a sound practical training in electrical engineering, and should hold at least a National Certificate in electrical engineering while some experience of the electrical operation of modern power stations is also desirable. The selected candidate will be required to pass a medical examination and to join the company's staff pension fund.—Apply to a local Ministry o Labour Employment Exchange. (S 128)

LANCASHIRE DYNAMO AND CRYPTO (MFG.) LTD. have vacancies for COLLEGE GRADUATES for two-year apprenticeship course. Applicants must possess a B.Sc. degree or Higher National Certificate in electrical engineering. Suitable applicants will be eligible for permanent position after completion. Pension scheme in operation. —Applications, stating details of training, experience and age, to Personnel Manager, Lancashire Dynamo and Crypto (Mfg.) Ltd., Trafford Park, Manchester 17. (S 129)

MANAGER required for Suburban Electrical Retailers and contractors (London). Good opportunity for man with knowledge and initiative.—Write, stating full details of experience and salary required, Box No. 1655, Electrical Times. (S 82)

MECHANICAL ENGINEER-DRAUGHTSMAN required for steam power station design. Previous power station experience not essential, but applicants must have layout experience. Salary fully appropriate to experience and capabilities. Excellent working conditions. —Apply, in writing, to Merz and McLellan, "Milburn" Esher, Surrey. (S 140)

POWER PLANT SHIFT CHARGE ENGINEER required by The Steel Company of Wales Ltd. Applicants should have served a recognised apprenticeship with a major engineering company, and have a sound general and technical education.

Experience in the following is desirable:—

(a) As Shift Charge Engineer.
(b) High pressure boiler and turbine operation.
(c) Operational control of an interconnected h.t. industrial network.
(d) Other works auxiliary services.

Salary according to age and experience. The post will be permanent and pensionable on satisfactory service. Applications in own handwriting should be addressed to: The Personnel Superintendent, The Steel Company of Wales Ltd., Box No. 3, Port Talbot. (S 147)

RADIO AND TELEVISION MECHANIC. A large, light electrical engineering company, in the West London area, require a Radio and Television Mechanic for their Engineering Laboratory. Applicants should have a good working knowledge of domestic electrical and mechanical appliances, including radio, television and industrial electronics. Minimum qualification: Higher National Certificate (Electrical). Special knowledge of electronics an advantage. Good conditions and pay.—Write, giving details of age, qualifications and experience, to Box No. 1679, Electrical Times. (S 171)

SENIOR ELECTRICAL ENGINEERING DRAUGHTSMAN required. H.N.C. desired but not essential. Experience required in power and lighting layouts, overhead and underground distribution schemes, power station and sub-station layouts. Five-day week.—Apply to Personnel Manager, Kellogg International Corporation, Stone House, Bishopsgate, London, E.C.2. (S 164)

TECHNICAL ASSISTANT required by British Insulated Callender's Cables, Ltd., for the technical development of electro static capacitors at their Helsby Works. Candidates should possess Higher National Certificate in electrical engineering. Permanent position with superannuation and bonus schemes after 12 months' probationary service.—Applications, giving details of qualifications and experience, should be made in writing to the Staff Officer, British Insulated Callender's Cables, Ltd., Prescot, Lancs. (S 169)

THE BRITISH DRIVER-HARRIS CO., LTD., invite applications for the following positions in their U.K. organisation from young men who have completed their National Service. The positions are permanent and pensionable.

(a) Young men of about 20 years to be trained as inside and/or outside SALESMEN. No previous experience is necessary, but applicants must have had a good general education.
(b) COSTING CLERKS with experience of the products of this company desirable but not essential.
(c) TECHNICAL men of at least ordinary degree standard or equivalent to conduct investigations into problems of manufacture and application of nickel and its alloys and co-related subjects. Spectrograph experience an advantage but not essential.

Applicants should write fully to the Secretary, Gaythorn Mill, Albion Street, Manchester 15. (S 163)

WORK WANTED

A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed. Edgware 8631 (4 lines). —Service Electric Co. Ltd., Stanmore, Middx. (D 324)

CAPACITY now available in our new works for winding stators, rotors, armatures and field coils from fractional up to 1,000 h.p.—Pearn, Greg & Armstrong Ltd., Hewitt Street, Knott Hill, Manchester. (S 188)

CAPACITY. Plastic compression and injection moulding. Toolmaking.—Greenwood Rawlins and Co., Ltd., Brook Road, Arterial Road, Rayleigh, Essex. (S 175)

CASTINGS. Fisher Foundries Ltd., Greet, Birmingham, have capacity for brass, gun metal and soft grey iron machine moulded repetition castings weighing 1-30 lb. Loose pattern work up to 3 cwt. Delivery by road to all parts. Tel.: B'ham, Victoria 0197. (P 570)

ZEROS REFRIGERATORS. Complete range of REPAIR AND SERVICE now available. Equipment reconditioned to conform to pre-war manufacturers' specifications.—Time Engineers Ltd., Refrigeration Specialists, 60 Southend Road, Rainham, Essex (Rainham 2358), or Southern Area Agency (Tel.: Springpark 4217). Electrical spares supplied to the trade. (S 96)

WANTED

A.C.—D.C. MOTORS, STARTERS, complete change-over installations, etc.—A.A. Electrical Co. Ltd., 67 Rothschild Road, Chiswick Park, W.4. Tel.: Chiswick 5105. (A 20)

BALL, Roller and Taper Roller Bearings purchased. Good prices paid.—Offers to Berend and Berend Ltd., 62 Berners Street, London W.1. (R 333)

REVOLVING FIELD-TYPE ALTERNATOR, 150 kVA, 100 cycles, voltage and speed immaterial. Must be in sound mechanical condition. Ball-bearing machine preferred.—Full details to Box No. 1661, Electrical Times. (S 97)

SCRAP ACCUMULATOR PLATES and Sediment wanted, any quantities. Also Storage Batteries purchased and dismantled.—Phone or write, Elton Levy Co. Ltd., St. Ermin's (West Side), Caxton Street, London S.W.1. Tel.: WHItehall 9621/2/3. (A 3)

WANTED: All types of Stationary Diesel Engines. Also Horizontal Hornsby Lamp Start Paraffin Engines.—Sippy and Co. Ltd., 118 Pepys Road, London S.W.20. Tel.: Wimbledon 5964. (S 125)

WANTED, ROTARY CONVERTORS any size.—Universal 221 City Road, London E.C.1. (A 16)

WANTED. Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock Water-tube Boilers. Best prices paid. Prepared to purchase Babcock and Wilcox Water-tube Boilers for dismantling. —Apply, giving full details to Midland Iron and Hardware Co., Cradley Heath. (A 5)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. and H. Cooper Ltd., 176 Brady Street, Bethnal Green, E.1. (A 1)

WANTED. D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co. Ltd., 22-26 Britannia Walk, London N.1. (A 13)

WANTED: Surplus Stocks of Twist Drills, Milling Cutters, Hacksaw Blades, Reamers, Chasers and all kinds of hand and cutting tools.—Send details to B. Draper and Son, Kingston Hall Road, Kingston-on-Thames. (A regular buyer of surplus tools.) (R 434)

WANTED, 1,000-r.p.m. ALTERNATORS, 20-30 kVA; also Isenthal REGULATORS.—L. Darley & Son Ltd., 59/61 St. Albans Road, Watford, Herts. (S 154)

£50,000

Immediate cash available for purchase of New Ball and Roller Bearings, all types, Steel Balls and Rollers. Top prices paid, small quantities accepted.

CLAUDE RYE LTD.,
895-921 Fulham Road, London, S.W.6
RENown 6174 (20 lines) (S 23p)

AGENCIES

ADVERTISER, with electrical and mechanical engineering knowledge, has small office and/or storage premises in centre of busy south coast town, who would consider opening up as exclusive MANUFACTURERS AGENT on salary, expenses and commission basis.—For further particulars please write Box No. 1681, Electrical Times. (S 174)

FOR SALE

CABLES & WIRE

CABLE, 7.052 PBJ 100,000 yards for sale from stock.—S. G. Young, 154/6 Blackfriars Road, S.E.1. WATerloo 3131. (S 20)

D.C.C. COPPER WIRE. Available for immediate delivery. 57 lb. 3 s.w.g.; 158 lb. 20 s.w.g.; 511 lb. 21 s.w.g.; 150 lb. 22 s.w.g.—Hirst, Ibbetson & Taylor Ltd., 47/55 Chapel Street, Salford 3, Lancs. (S 153)

ENAMELLED COPPER RESISTANCE WIRES—SILK and COTTON-COVERED INSULATION. Usually stock.—Send inquiries: The Saxonia Electrical Wire Co., Ltd., Roan Works, Greenwich, S.E.10. (S 176)

GALVANISED STEEL WIRE ROPE (1 in. diameter) for overhead suspension of electric cables employed in lighting zebra pedestrian crossings, sea-front illuminations, electric railways, trolleybuses, etc. Immediate delivery, at considerably below present makers prices, special discounts large orders.—Dominion Sales (London), 6 Finsbury Square, E.C.2. Tel.: Metropolitan 9017-8. (S 177)

DOMESTIC APPLIANCES

IMMERSION HEATERS. Grubb 4 kW, no purchase tax. All lengths 16 in. to 36 in. Standard voltages. Provision for intermediate loadings. Fully guaranteed. Prompt delivery.—Write for latest lists and trade terms to Distributors, John Owner and Co. Ltd., Springfield Road, Birmingham 13. Tel.: Springfield 2939. (C 392)

IMMERSION HEATERS. "MORAHEAT," 4 kW, with Satchwell Thermostatic Control, 16 in. to 42 in. Fully guaranteed, reliable, competitive, good deliveries.—Apply, Agent, W. Tyler, 20 Finnemore Road, Little Bromwich, Birmingham. (R 304)

ENGINEERING PLANT & MATERIALS

BRASS and COPPER to your own specification. Any quantity. Very good deliveries.—Apply, Arenson, EDGware 8116. (S 178)

80,000

NEW BALL RACES, ROLLER, THRUST AND TIMKEN RACES in stock. Advise requirements.

CLAUDE RYE LTD.,
895-921 Fulham Road, London, S.W.6
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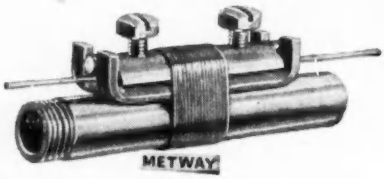

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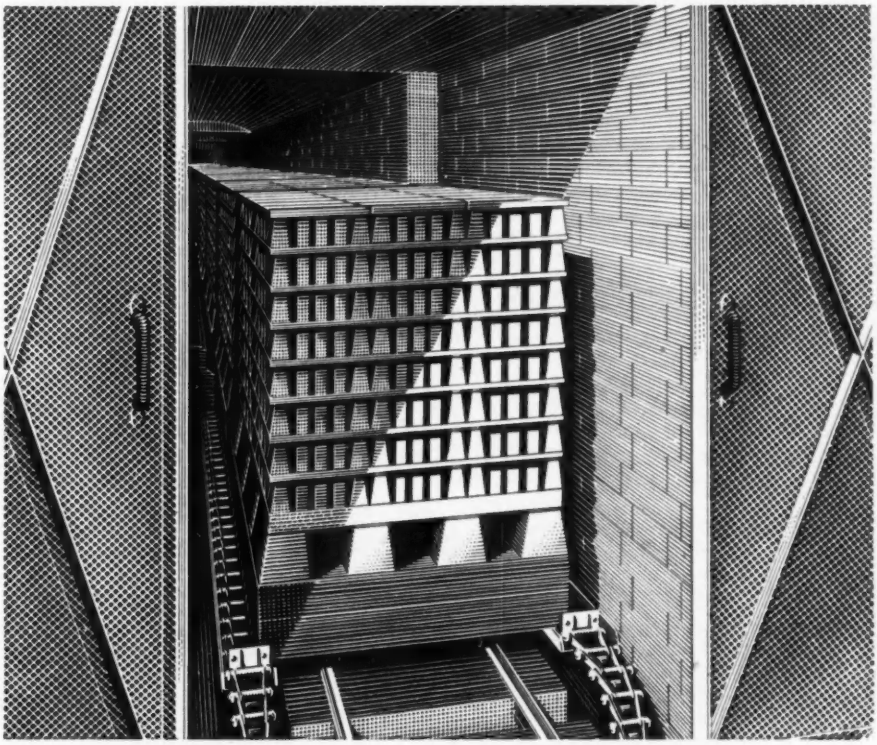

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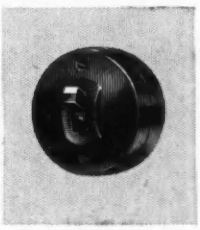

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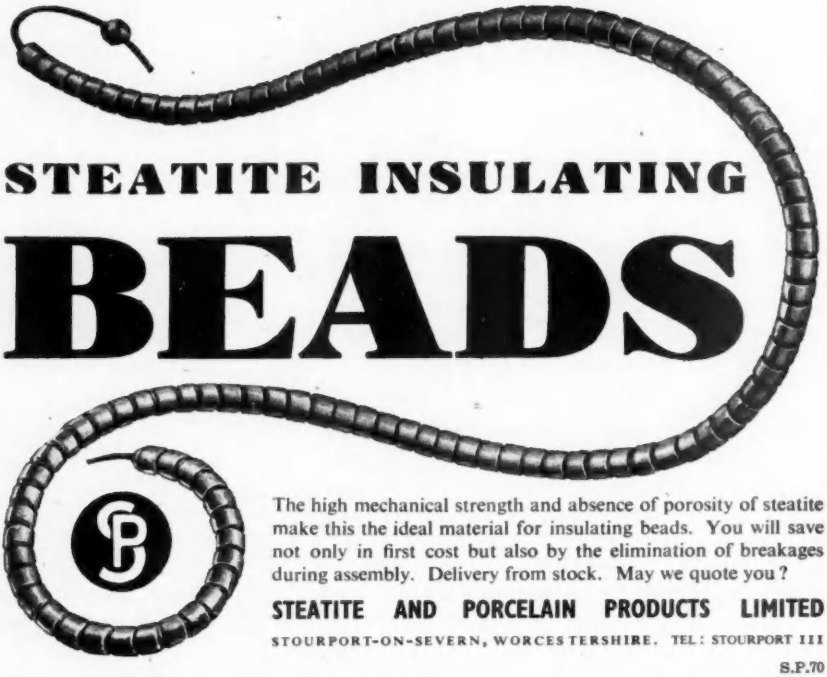

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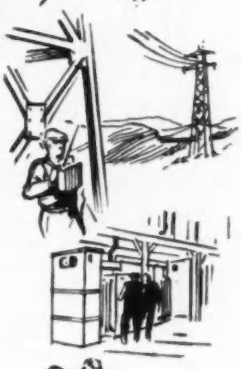

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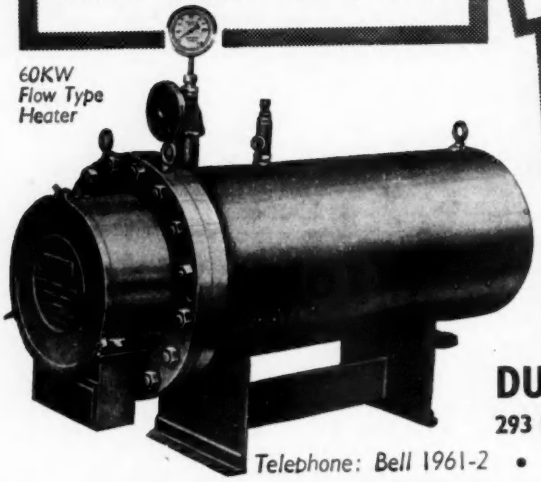

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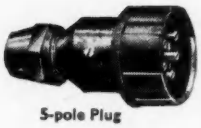
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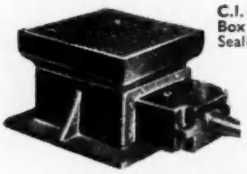
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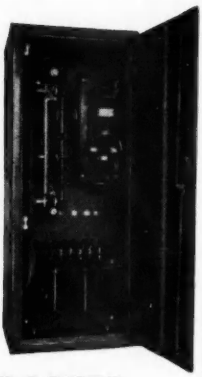

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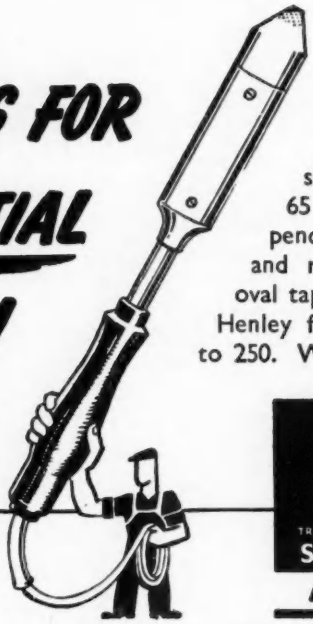

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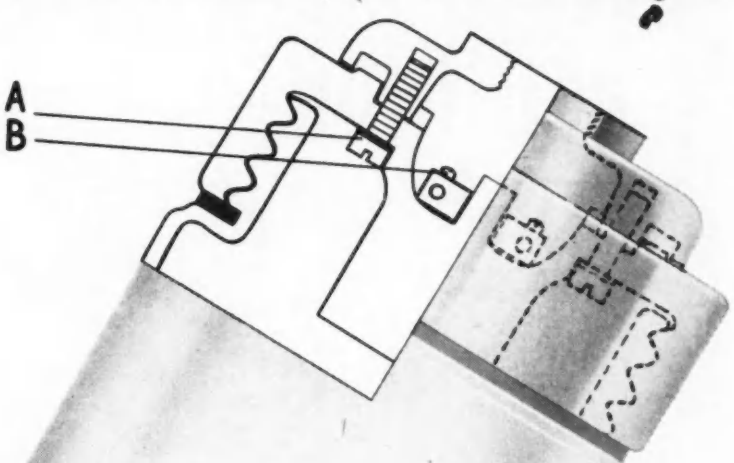

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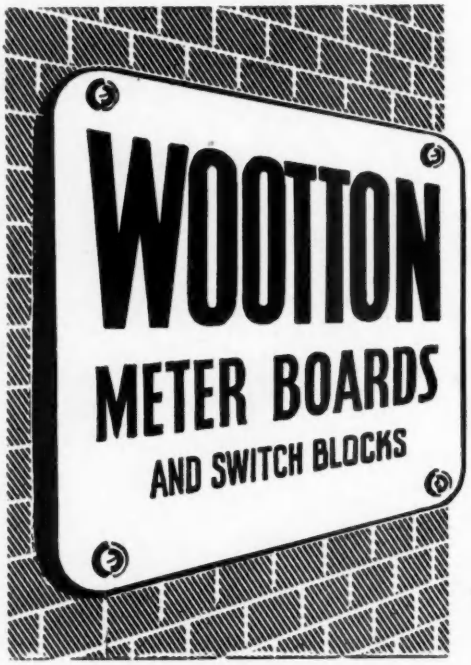

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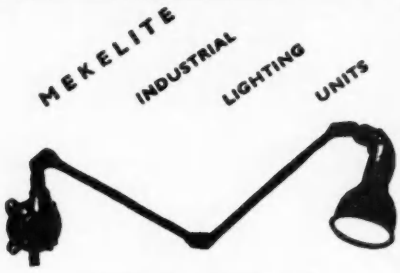

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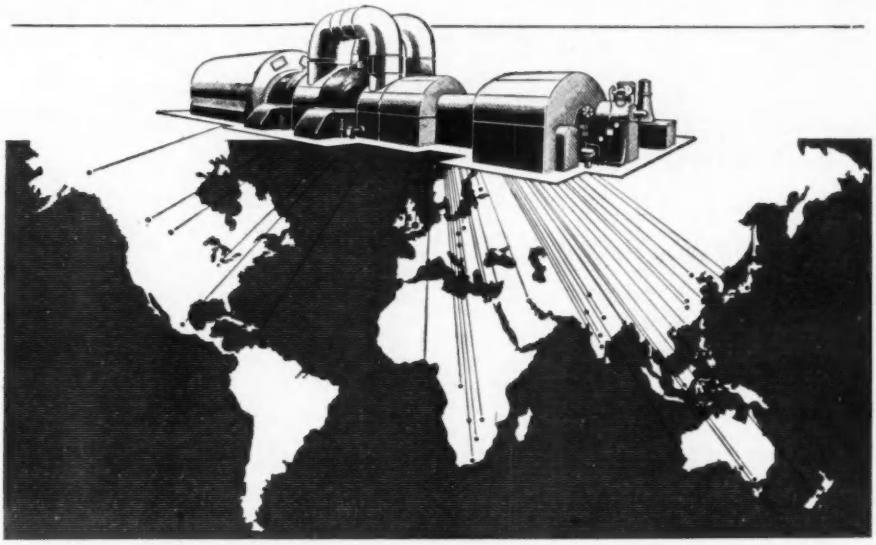

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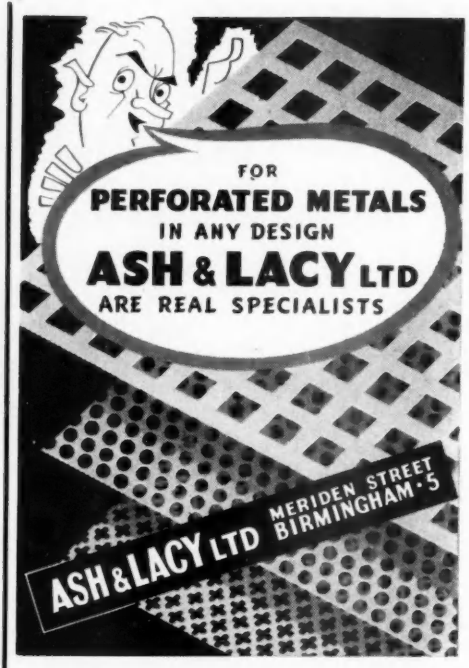

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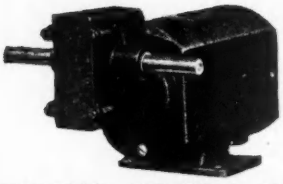

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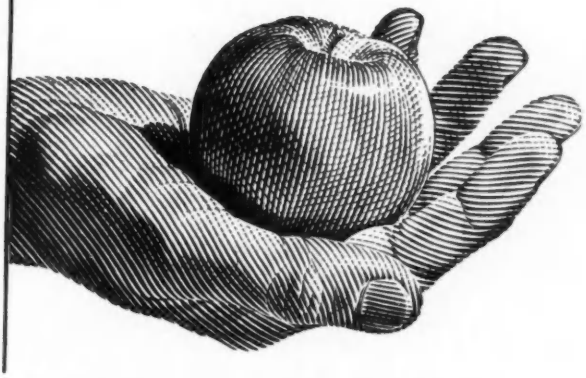

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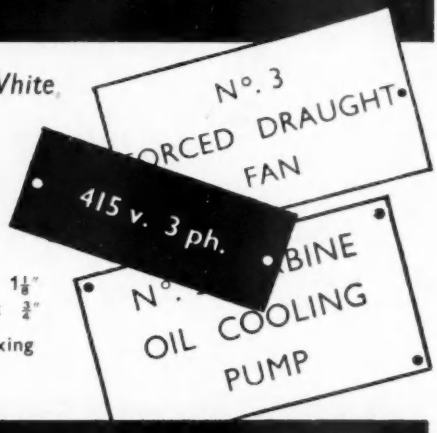

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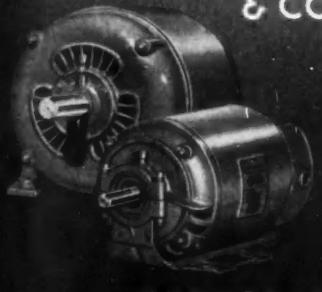

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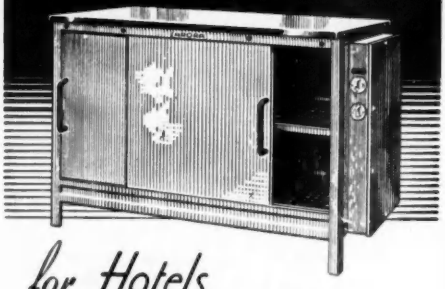

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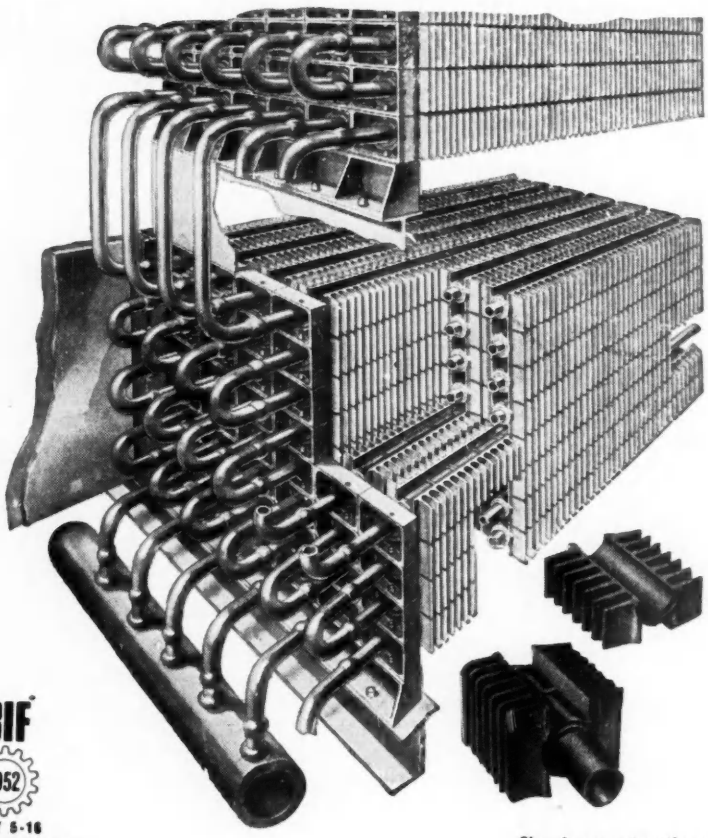

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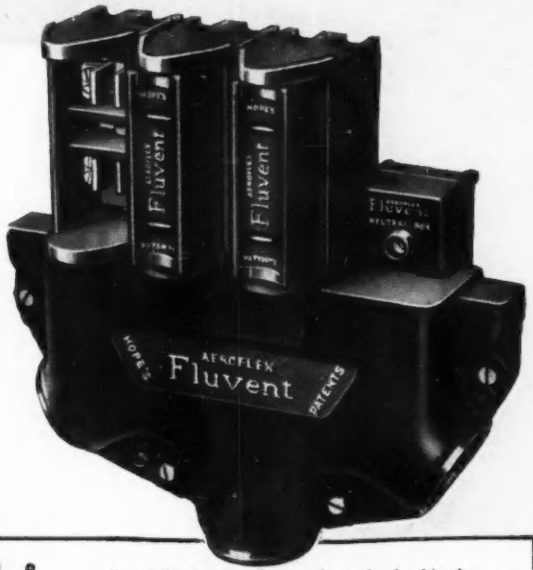

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